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1908





HEARINGS

BEFORE THE

U.S.
SUBCOMMITTEE OF THE COMMITTEE
ON APPROPRIATIONS, HOUSE OF
REPRESENTATIVES

592
116

CONSISTING OF

Messrs. WALTER I. SMITH (chairman), J. V. GRAFF,
F. H. GILLET, SWAGAR SHERLEY,
and J. J. FITZGERALD,

IN CHARGE OF

THE FORTIFICATION APPROPRIATION BILL

WASHINGTON
GOVERNMENT PRINTING OFFICE

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FORTIFICATION APPROPRIATION BILL.

Hearings conducted by the subcommittee, Messrs. W. I. Smith (chairman), J. V. Graff, F. H. Gillett, Swagar Sherley, and J. J. Fitzgerald, of the Committee on Appropriations, House of Representatives, in charge of the fortification appropriation bill, on the days following, namely:

MONDAY, February 17, 1908.

CONSTRUCTION OF GUN AND MORTAR BATTERIES.

STATEMENT OF BRIG. GEN. ALEXANDER MACKENZIE, CHIEF OF ENGINEERS, ACCOMPANIED BY COL. FREDERIC V. ABBOT, CORPS OF ENGINEERS, U. S. ARMY, ASSISTANT IN HIS OFFICE.

Mr. SMITH. General Mackenzie, the engineer corps has charge of the construction of gun and mortar batteries. On the first page of the bill I notice that your estimate for 1909 for gun and mortar batteries for the United States is \$4,247,400. You have received no general appropriation for this since the act approved April 21, 1904, and you have not made any estimate for it since 1904, in the regular annual estimates?

Colonel ABBOT. We have submitted them to the Secretary of War, and they have gone in our own annual reports every year.

Mr. SMITH. But it has never been submitted by the Secretary of War until now.

Colonel ABBOT. No, sir.

Mr. SMITH. How much of this estimate is for the Atlantic coast as distinguished from the Gulf coast?

General MACKENZIE. We have a table that we will leave with you which shows that \$997,400 is for Boston; \$895,000 for the eastern entrance of Long Island Sound; \$1,220,000 for the mouth of Chesapeake Bay, and \$1,135,000 for Puget Sound. So that it is all really for the Atlantic Coast excepting the \$1,135,000 for Puget Sound.

Mr. SMITH. There is no item for the Gulf coast?

General MACKENZIE. No item for the Gulf coast.

Mr. SMITH. Do you not regard Boston as fairly effectively fortified now?

General MACKENZIE. No, sir; not since we have opened up the new Broad Sound Channel, which is comparatively undefended.

Mr. SMITH. What defenses are there for that channel?

Colonel ABBOT. There are five ten-inch guns with quite long range; one ten-inch gun firing extremely obliquely, three twelve-inch guns at a range of from three miles, and 16 12" mortars at the same range, approximately.

Mr. SMITH. How long has this new channel been opened?

General MACKENZIE. The thirty foot channel has been open for several years, but now we are digging out a thirty-five foot channel.

Mr. SMITH. In the same place?

General MACKENZIE. Virtually in the same place.

Mr. SMITH. And the guns are as effective for the new channel as for the old channel?

General MACKENZIE. Yes, sir. This thirty foot channel is the new channel. We will have both a thirty and a thirty-five foot channel from Broad Sound.

Mr. SMITH. But you say the thirty foot channel has been completed for some time?

General MACKENZIE. Only a few years, since the fortifications were virtually located.

Mr. SMITH. About how long ago, if you know?

General MACKENZIE. I would say not over three years.

Colonel ABBOT. It has been completed I think since they stopped appropriating for fortifications—but I am not quite certain.

Mr. SMITH. You estimate only for Puget Sound on the Pacific coast?

General MACKENZIE. That is all.

Mr. SMITH. What about San Diego; is that in need of defense?

General MACKENZIE. Well, San Diego is of course defended to a certain extent.

Mr. SMITH. But very limited, is it not?

General MACKENZIE. Comparatively limited.

Colonel ABBOT. It has a very shallow entrance at the present time so that it could not be attacked by heavy-draught iron-clads as they could not get in.

General MACKENZIE. Conditions change. There is a recommendation for a channel at San Diego, so some day they will be in the same condition there as they were at Boston.

Mr. SMITH. What is the state of the fortifications at San Francisco?

General MACKENZIE. San Francisco is pretty thoroughly defended so far as the general matter of gun and mortar batteries is concerned.

Mr. SMITH. Is the estimate for seacoast batteries at Puget Sound what you would regard as completing the scheme at Puget Sound, or simply for the amount you would like to use this year?

Colonel ABBOT. It is the amount we could use this year on the sites we now own. There are a couple of sites that will have to be bought out there, and we did not include in any of these estimates batteries whose sites we did not own.

Mr. SMITH. What is the amount?

General MACKENZIE. \$1,135,000.

Mr. GILLET. Does this construction of gun and mortar batteries include the guns themselves?

Mr. SMITH. Oh, no. Because of the fact that Mr. Gillett has had but little experience on this subcommittee, I would suggest that you explain how the construction of a fortification is divided up among the different corps of the War Department.

General MACKENZIE. What is termed the emplacement, that is the concrete construction, the furnishing of the platforms for the guns, the parapets protecting the guns and the magazines, and all that work is constructed by the corps of engineers. The guns and mortars are constructed by the ordnance department.

Mr. SMITH. Including the carriages?

General MACKENZIE. Including the carriages.

Mr. SMITH. And they provide the ammunition?

General MACKENZIE. Yes, sir.

Mr. SMITH. You provide the site as well as these structures?

General MACKENZIE. Yes.

Colonel ABBOT. The quartermaster's department supplies the quarters for the garrison; the signal corps supplies the information equipment, such as the cables, the wiring, the telephone instruments, and things of that kind in connection with transmitting information needed for fire control; the engineers build the fire control structures, the actual buildings, the observing stations, the underground ducts, and pull into the latter the signal corps cables, as well as the engineer power cables.

Mr. SMITH. And the power structures for the current, and such things as that?

Colonel ABBOT. Yes, sir.

Mr. GRAFF. Did you say that \$1,135,000 was for Puget Sound; that that was practically all you have estimated for the Pacific coast; and that the balance of the estimate was for the Atlantic Coast?

Mr. SMITH. That is correct.

Colonel ABBOT. And the estimates were strictly in accord with the recommendations of the Taft Board as to the order in which the various defenses should be put in, so far as was permitted by our present ownership of land.

Mr. SMITH. Now, which do you regard as of first importance in these estimates for construction of gun and mortar batteries in the continental United States?

General MACKENZIE. I should, of course, follow the recommendations of the Board.

Mr. SMITH. And you have arranged them in that order?

General MACKENZIE. Yes.

Mr. SMITH. Will you please read that order to us now?

General MACKENZIE. Mouth of Chesapeake Bay, \$1,220,000. Eastern entrance of Long Island Sound, \$895,000. Puget Sound, \$1,135,000. Boston, Massachusetts, \$997,400. Of course, there has been more agitation in connection with Puget Sound than there has been of these other matters.

Mr. SMITH. For reasons that we all understand. You have spoken of the entrance to Chesapeake Bay. What sites have we there?

General MACKENZIE. We have no sites as yet.

Mr. SMITH. When you said that you had put these in in the order of the Taft Board, so far as the sites are concerned you did not mean this?

Colonel ABBOT. We have a site for an artificial island donated by the state of Virginia, but we have not built that island up.

Mr. SMITH. Who authorized you to accept that island as a site?

Colonel ABBOT. It was accepted, I think, by the Secretary of War.

Mr. SMITH. What authority did he have for accepting a gift of land to the United States from the state of Virginia?

Colonel ABBOT. That is a legal question, and I do not know.

General MACKENZIE. We have accepted sites, and I presume it is the same, in connection with river and harbor work. In that work the law authorizes the acceptance of land.

Colonel ABBOT. Quite a number of our sites have been given to us by the States for fortification purposes.

Mr. SMITH. This acceptance of sites that you have spoken of is an acceptance for work authorized to be done by Congress.

Colonel ABBOT. That is it in many cases, but at Portsmouth, N. H., for instance, we were given land long before there was an appropriation, and in the early part of the last century a great many different sites were given us for batteries.

Mr. FITZGERALD. Where you have been authorized to do work and have money appropriated to acquire sites, instead of purchasing the sites they have been donated and thus the Government has been saved that money?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. But this is a case where there has been no authorization to do anything; somebody has donated the land, and somebody has accepted it on behalf of the Government.

Colonel ABBOT. The point may be stated somewhat in this way: The fortification appropriation does not specify any particular location for the application of funds and Chesapeake Bay defenses could have been begun on the initiative of the War Department. As it happens, this site was offered to us since Congress had appropriated funds for any fortification work in the Continental United States; if there had been any funds remaining which had been appropriated in a former fortification bill, then some of it might have applied to the defenses of Chesapeake Bay. But in this case there actually was not sufficient money, so the reasoning does not apply.

Mr. SMITH. The estimate \$1,220,000 you make for Chesapeake Bay does not include the island?

Colonel ABBOT. No, sir.

Mr. SMITH. You have no site at the mouth of Chesapeake Bay excepting this one in the middle of the channel presented by the State of Virginia?

Colonel ABBOT. No, sir.

Mr. GILLETT. When was that island donated?

Colonel ABBOT. About a year ago.

Mr. SMITH. When you were last here, there had been no surveys made, no soundings made, to any considerable extent, to determine the actual cost of the construction of this proposed island. Have the soundings and borings of that survey been made?

Colonel ABBOT. No, sir, there was no appropriation, so we were unable to do anything more than put in the estimates submitted by the Taft Board.

Mr. SMITH. And you know that the records of the War Department state that that estimate was made without borings, without soundings and without any survey?

Colonel ABBOT. Not without a survey. It was based upon the charts of the Coast and Geodetic Survey.

Mr. SMITH. The Coast and Geodetic Survey work does not extend to boring or ascertaining the quality of material underlying the surface?

Colonel ABBOT. No, sir, beyond the fact that the soundings are sometimes marked hard and soft, and sometimes sticky; but it does generally record the surface observations.

General MACKENZIE. Of course, the figures were made by the District engineer officer in the locality, who had gone generally into the local conditions.

Mr. SMITH. So far as anybody had knowledge; but no borings have ever been made by anybody in the vicinity of this proposed island, and there is no information in your possession as to whether the material from which you would seek to construct the island was dredgable or not.

Colonel ABBOT. That is all dredgable down there. It is all sand or mud. We can get material for fill by pumping, without any question.

Mr. SMITH. Do you know the history of the Ripraps?

General MACKENZIE. We have the history in the office, a complete detailed history of it, but I do not know whether Colonel Abbot has investigated it very far or not.

Colonel ABBOT. Yes, I know a good deal about it.

Mr. SMITH. How many years is it since the Ripraps were constructed?

Colonel ABBOT. I should say about 60 or possibly 70 years.

Mr. SMITH. How far is it from the ripraps to this proposed island?

Colonel ABBOT. About seventeen or eighteen miles.

Mr. SMITH. And in the same general location so far as the character of the soil is concerned, so far as you know?

Colonel ABBOT. Yes, sir.

Mr. SMITH. Tremendous difficulty has been experienced has there not, during all these sixty or seventy years, in getting a solid foundation for the ripraps?

Colonel ABBOT. The way they were built, but not the way they propose to build the new islands. There has been no trouble in the foundations upon islands built in Tokyo harbor in much greater depth of water.

Mr. SMITH. Isn't it a fact that the islands in Tokyo harbor have been practically abandoned by the Japanese government?

Colonel ABBOT. Not unless that has been done since I was there, about two months ago; they were building a new one then.

Mr. SMITH. Is it not generally understood that they were abandoning them?

Colonel ABBOT. I did not see anything that would induce that opinion, although I did not go ashore.

Mr. SMITH. Do you think they are building another?

Colonel ABBOT. I know they are.

Mr. SMITH. And how many islands will that make?

Colonel ABBOT. There are three of them down toward the entrance, and two farther up in the bay, which I did not see, that makes five.

Mr. SMITH. Does that include the one now in the course of construction?

Colonel ABBOT. That means all.

Mr. FITZGERALD. What is the unexpended balance in this fund?

Colonel ABBOT. About \$43,000 at present.

Mr. FITZGERALD. Is that balance unexpended, or unallotted?

Colonel ABBOT. Unexpended but all pledged for actual work.

Mr. FITZGERALD. On the 31st of December, 1905, you had a balance of \$585,015.41.

Colonel ABBOT. On February 10, 1908, the entire balance on hand was pledged. We are using our last cents. We have finished the batteries, all of them practically, and are applying the last balances we have on hand to installation of electrical appliances necessary for ammunition service.

Mr. GILLETT. Do these estimates complete the work in each one of the different places?

Colonel ABBOT. They complete the batteries for which we have now sites at these four harbors.

Mr. GILLETT. Would they complete the fortifications at those places?

Colonel ABBOT. At Boston they would, yes, sir. At the eastern entrance of Long Island Sound, no. At Chesapeake Bay, no.

Mr. GILLETT. Then this is a continuing appropriation.

Colonel ABBOT. It will put in certain batteries at these places of which we give the names.

Mr. GILLETT. As to Chesapeake Bay, that is not completed?

Colonel ABBOT. The estimate is to complete the emplacements for the armament proposed for the artificial islands.

Mr. GILLETT. As to Puget Sound?

Colonel ABBOT. Puget Sound is not completed because there are two sites still to be acquired out there.

Mr. SMITH. You have included nothing in your estimate for fortifications at the mouth of Chesapeake Bay excepting on the artificial island?

Colonel ABBOT. On the artificial island.

Mr. SMITH. So that your estimates do not contemplate the expenditure at this time of any money at Cape Henry or at Cape Charles?

Colonel ABBOT. Not a cent.

Mr. SMITH. If you got the money for the artificial island, it would not be completed in the next year, would it?

Colonel ABBOT. Hardly.

Mr. SMITH. So that you would not have the slightest use for money at the mouth of Chesapeake Bay in any event?

Colonel ABBOT. I am not sure of that, considering one way of constructing those emplacements. The best way, perhaps, would be to put down concrete pile foundations for the gun platforms before we did any filling. We would then have foundations on to the solid original bottom, and would escape the settlement due to building on riprap foundations.

Mr. SMITH. But you have no information that you have a solid bottom?

Colonel ABBOT. It is marked "hard" on the charts.

Mr. SMITH. That would simply mean——

Colonel ABBOT. Hard sand.

Mr. SMITH. But not anything more?

Colonel ABBOT. Hard sand makes a good foundation.

Mr. SMITH. Have any definite plans been made, so that you can say they are plans, to put in the foundations for the emplacements before filling the island?

Colonel ABBOT. No, sir, but our estimates are large enough for the individual gun emplacements, to build them in that way. If you will notice the cost you will see that it is considerably above that of

the usual battery; there are a number of ways in which that construction can be done satisfactorily.

Mr. FITZGERALD. What is the estimate of the cost of the entire scheme, the fortifications at Cape Henry, Cape Charles, and at this artificial island?

Colonel ABBOT. The Taft Board report gives the following figures which includes all ordnance, signal corps and engineer work combined: For gun carriage emplacement \$4,795,300. For submarine mine defense \$412,096. Central power plant \$141,817. For reserve power plants \$56,557. Search lights \$170,000. Fire control \$527,101, making a grand total of \$6,102,871.

Mr. FITZGERALD. That excludes the cost of acquiring sites on those two capes?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. Have you any estimate of what those sites will cost?

Colonel ABBOT. \$2,600,000 is the estimated cost of the artificial island; and we must make a purchase of land at Cape Henry for which we will have to have practically a half million dollars.

Mr. FITZGERALD. Is that where they want \$4,000 an acre?

Colonel ABBOT. They put in a bill at the last Congress ordering the purchase of two square miles, for \$500,000.

Mr. SMITH. Was that for both Cape Henry and Cape Charles?

Colonel ABBOT. Cape Henry alone.

General MACKENZIE. Cape Charles was \$30,000.

Colonel ABBOT. That is for a small island right off Cape Charles.

Mr. GILLETT. Then it would be something over \$3,000,000 for the sites.

Mr. SMITH. And that would make a total of \$9,232,871. If we were to start part of this work, it would be of very little value unless completed in accordance with the plans of the Taft Board?

Colonel ABBOT. Yes, sir.

Mr. SMITH. What would be the effect of long range batteries mounted on Capes Henry and Charles without the artificial island?

Colonel ABBOT. It would not prevent anything from coming in.

Mr. SMITH. So that you would regard any construction of batteries on Cape Henry or Cape Charles as worthless unless Congress appropriated the money to carry out this island project?

Colonel ABBOT. I do, sir, unquestionably.

Mr. FITZGERALD. Who is the proper officer to express an opinion as to the completeness of defenses already inside Chesapeake Bay, the engineer corps or what corps?

General MACKENZIE. That matter of course was quite thoroughly gone into by the Taft Board. The navy has been especially earnest in its presentation of the necessity for protecting the mouth of the Bay, and undoubtedly with good reason. The question was quite thoroughly discussed before the Taft Board.

Mr. GILLETT. And I suppose the Taft Board also discussed the situation at Puget Sound, and these other projects?

General MACKENZIE. Yes, sir.

Mr. SMITH. Before passing from this subject, let us take up briefly the eastern entrance of Long Island Sound. To what extent has the channel there been modified in recent years, or since the construction of existing fortifications?

General MACKENZIE. There has been no material change in the channel.

Mr. SMITH. What was the necessity then for the fortifications at the eastern entrance of Long Island Sound?

General MACKENZIE. The necessity always has existed only they were not originally completed.

Colonel ABBOT. There was a little change of policy. The original idea was to close the entrance to New York at Throgs Neck and Willets Point, where we have practically an inner line of defenses, Fort Schuyler and Fort Totten. As the cities on the shores of Long Island Sound became more and more important with the lapse of time, the Board of Engineers decided that it was advisable to throw out an outer line of defenses near the eastern entrance of Long Island Sound, not with the idea of entirely excluding a fleet, but with the idea of making its passage risky so that these smaller cities would not be liable to a naval raid, still leaving for Forts Totten and Schuyler the crux of the defense of New York City itself. The latest idea, since that Board of Engineers' report, as brought out by the Taft Board, is that we must absolutely defend the whole of Long Island Sound because the territory has become so much more valuable than it was twenty years ago. That eastern end is the place that now must be held, formerly it was not considered necessary. The increasing value of the cities upon the Sound have made it a necessity to convert what was formerly a moderate barrier into an absolute stoppage, like Gibraltar.

Mr. SMITH. So that this primarily was for the defense of New York, but is primarily now for the defense of the cities along Long Island Sound.

Colonel ABBOT. And to refuse to a hostile navy the use of the Sound as a naval base.

Mr. SMITH. One of the points heretofore was Fisher's Island?

Colonel ABBOT. That is Fort H. G. Wright.

Mr. SMITH. What would be the distance of open water between the fortifications at the eastern entrance of Long Island?

Colonel ABBOT. At the Race it is about five and one-quarter miles; but we have heavy guns on both sides of the Race.

Mr. SMITH. What is your purpose in enlarging this, to make it impregnable in place of an annoyance? Just give your reasons in a general way.

Colonel ABBOT. We increase the armament bearing on the Race by some very heavy caliber guns, 14-inch guns instead of 12-inch guns.

The main weakness in the existing defenses is on the southern side. Upon that portion of the entrance we propose to buy land and to put in batteries to close the channel between Fort Terry, which is on Plum Island, and the Long Island shore.

Mr. SMITH. What is the distance over the open water?

Colonel ABBOT. Plum Gut, the channel in question, is something like two miles wide, but the existing guns are all on one side, at Fort Terry. There are none on the Long Island side.

Mr. SMITH. You do not mean to say that the 14 inch gun is more effective than the 12 inch gun, do you?

Colonel ABBOT. Yes, I do, at long ranges.

Mr. SMITH. Do you mean fired with the same initial velocity as the 12 inch gun?

Colonel ABBOT. Yes, because the heavy projectile carries the velocity much further.

Mr. SMITH. Has it been contemplated in erecting the fortifications that the fourteen-inch gun is more effective than the 12" gun if fired with the same velocity?

Colonel ABBOT. Not more powerful than the 1900 gun fired with its originally projected charge, but it is designed to have much more destructive power at long ranges than the 1900 model of the 12-inch gun with the charge which they now fire therein.

Mr. SMITH. Were you advised last year that this project of substituting 14-inch guns for 12-inch guns was not for the purpose of increasing the force of the projectile at the point of contact, but was for the purpose of reducing the velocity so as to get the same force at the point of contact.

Colonel ABBOT. Out to a certain range, but beyond that you get a greater remaining velocity in your projectile so that it strikes a much heavier blow than the projectile from the 12-inch gun, model of 1900, that is, with the charges that they now find they can use with that gun. The 1900 model gun, with the full charge, would strike as hard a blow as the 14-inch gun, but will not stand many rounds with that charge. The 14-inch gun will give us at these long ranges a striking force which the 1900 model 12-inch gun could not give unless fired with the full originally proposed charge of powder.

Mr. SMITH. Is it not this; that the 14-inch gun is longer effective than the 12-inch gun, with the discharge made at full velocity?

Colonel ABBOT. That is true, only they are not firing the 12-inch gun at that velocity any more.

Mr. SMITH. The original velocity was 2,500 feet. The velocity of the 14-inch gun was planned at 2,200 feet?

Colonel ABBOT. Yes.

Mr. SMITH. As a matter of fact, while you get the same force of impact, you get a more glancing blow with the 14-inch gun than with the 12-inch gun, do you not?

Colonel ABBOT. I should doubt that.

Mr. SMITH. Is not the trajectory greater in the 14-inch gun at a 2200 feet velocity than in a 12-inch gun at a 2500 foot velocity?

Colonel ABBOT. The projectile is heavier, and while the highest point of the trajectory may perhaps be higher, the resistance to glancing is greater with the heavy 14-inch projectile than with the lighter 12-inch projectile.

Mr. SMITH. But it does strike a more glancing blow?

Colonel ABBOT. Do you mean against the side of a vessel?

Mr. SMITH. The target, you think, would not so greatly resist the glancing by reason of the greater weight?

Colonel ABBOT. Not only that, but when you get to extreme ranges with any of these guns the angle of fall is very considerable, and it only takes a very little change in elevation to throw the projectile over the small height of the side of a ship; the more you curve the fire, the broader is the horizontal target exposed by the deck, and the deck is the most vulnerable part of a vessel, and the heavier shot is most likely to penetrate the deck.

Mr. SMITH. The deck is the hardest to hit, is it not?

Colonel ABBOT. Yes; the curvature of the trajectory makes it harder to hit at long ranges; the chances of hitting with a gun are about inversely as the square of the range.

Mr. FITZGERALD. What will be the total cost of these eastern entrance of Long Island Sound fortifications?

Colonel ABBOT. According to the Taft Board, for all of the items, the engineer, the ordnance and the signal corps, \$5,075,706.

Mr. FITZGERALD. Does your estimate in this bill cover the whole work?

Colonel ABBOT. No, sir, it is only that portion of our work for which we at present own the sites.

Mr. FITZGERALD. Do the Taft Board estimates include, in the figures you have given, the cost of the sites?

Colonel ABBOT. There is not any detailed division of cost of sites in the Taft Board report.

Mr. FITZGERALD. What I want to know is, what would be added in addition.

Colonel ABBOT. For the whole United States the cost of the additional land is estimated at \$1,493,861. That does not include the \$2,600,000 estimated as the cost of creating the island at the mouth of Chesapeake Bay. I can not give the subdivision of the Taft board items for land defenses. For one reason it was considered inadvisable to publish the amount it was thought the land was worth, because if that estimate was too high the owners would consider it worth that, and not take less.

Mr. SMITH. The only project on the Pacific coast that is pressing is Puget Sound?

Colonel ABBOT. It is desirable beyond any question as to Puget Sound, to do more than we have done there. The original project is not yet completed, but Puget Sound should not in any sense be considered as in a defenseless condition at the present time.

Mr. SMITH. You did not answer as to how much it would take to complete the defenses at Puget Sound according to the present plan. Please give us the total.

Colonel ABBOT. \$5,519,349.

Mr. SMITH. How much of that was for the engineer work?

Colonel ABBOT. I can figure that out in the office, but I have not the data right here.

Mr. SMITH. Was it a little more than half?

Colonel ABBOT. About three millions of dollars—I suppose in the vicinity of two millions of dollars for battery construction alone. The exact figures are \$2,859,752 and \$1,910,000, I find.

Mr. SMITH. So that you are asking for practically the whole for this year?

Colonel ABBOT. We are asking for \$1,135,000. There is quite a difference.

Mr. SMITH. Is that \$1,135,000 for batteries alone?

Colonel ABBOT. Yes, sir.

Mr. SMITH. Have you all the sites on Puget Sound?

Colonel ABBOT. No, sir, we have to buy two sites.

Mr. SMITH. I am asking you now whether you are not estimating this year for practically the whole engineer's expense. If the whole expense is only two million and a half, you are asking now for \$1,135,000 for batteries alone.

Colonel ABBOT. The gun carriages and emplacements are \$3,413,600, of which, judging from the usual proportion between ordnance and engineer corps, the engineer amount would be about two millions of dollars.

Mr. SMITH. What would you say was the total cost of the entire project, about five millions of dollars?

Colonel ABBOT. About \$5,519,000.

Mr. SMITH. So that when you gave your estimate a moment ago on the total engineer's cost, you did not mean to include anything except the emplacements?

Colonel ABBOT. That is all.

Mr. SMITH. Not sites, or fire control, or any other branch of the engineer corps work excepting the emplacements. Then of course you did not include it all.

Colonel ABBOT. \$1,135,000 out of a probable \$2,000,000—I can give you the exact figure, but that would not be very far off.

Mr. GRAFF. In speaking of the points on the Atlantic coast, did you include any excepting Boston, the eastern end of Long Island Sound, and Chesapeake Bay?

Colonel ABBOT. That is all we estimated for; to complete as far as we have the land.

Mr. SMITH. There are four projects estimated for by them, upon the continental United States, Chesapeake Bay, eastern entrance of Long Island Sound, Puget Sound, and Boston.

Colonel ABBOT. Yes, sir, and that was the order in which they were specified in the report of the Taft Board.

MODERNIZING OLDER EMPLACEMENTS.

Mr. SMITH. The next item is for modernizing older emplacements. You have, at previous hearings, generally described the character of this work. To what extent do you say that your emplacements now are deteriorated, that is, the existing emplacements?

Colonel ABBOT. It is not so much a question of deterioration as it is of improvement in the later types, and greater completeness—the additional conveniences.

Mr. SMITH. You have told us before that the firing of the guns tended to disturb the concrete.

Colonel ABBOT. But that is under Preservation and Repair. The modernizing is bringing older types up to date, while the other is to keep existing batteries in the condition in which they are.

Mr. SMITH. Do you say that the \$100,000 given you last year was not sufficient to fairly keep them in modern shape?

Colonel ABBOT. We made an original estimate of \$942,500, of which you have given us \$700,000; and we want the balance to complete the items that we made our original estimate on.

Mr. SMITH. So that when you made up your estimate of \$242,500, it was simply the balance that we had not given you of the original estimate, is that it?

Colonel ABBOT. Yes, sir.

Mr. SMITH. Do you say that since the original estimate was made there has been a further change?

Colonel ABBOT. Yes, but the \$942,000 will come close to what we intended to finish in the first place. We have asked an appropria-

tion under this heading of the balance formerly appropriated for dynamite batteries, because the whole question of powder service has come up since that time. Up to that time the powder had been carried up by hand, but since then it has been found possible to fire the guns much faster than was originally anticipated and carrying the powder long distances by a crooked route, and upstairs, involves such a great number of men, that we believe it is cheaper for the United States to put in mechanical powder service. The powder is in bags of about 100 pounds, and where a man has to go a distance of 150 feet and carry it up stairs a height of 12 or fourteen feet high, he can not continue to do it at sufficient speed to deliver those charges fast enough; the twelve-inch gun takes four powder bags for each charge, and you must have approximately four hundred pounds of powder delivered at the breech of a gun for a charge every time it is fired. They fire the gun at intervals of less than a minute; it takes four men to carry one charge, and there must be relays enough to cover this distance up and down stairs, and keep powder always ready as soon as the gun has been fired.

Mr. SMITH. Is that under modernizing older emplacements?

Colonel ABBOT. It is, and it is a question that has come up since this estimate went in.

Mr. SMITH. Why is there necessity for using two different items here? The next item is for improvements in the ammunition service. Are you not now paying for improvements in that service out of the other item?

Colonel ABBOT. That was for projectiles. This is a new question.

Mr. SMITH. Can we not give you this under the other language?

Colonel ABBOT. Yes, sir; the wording will cover the work just as well if you give us the amount of money under that heading. This sum has been previously appropriated, and if you make it available for these general purposes, we will put it into the powder service.

Mr. SMITH. As a matter of fact this money will never be drawn from the Treasury for the purpose for which it has been appropriated.

Colonel ABBOT. Never in the world.

Mr. SMITH. So that it is practically about the same as giving you a new appropriation.

Colonel ABBOT. Absolutely.

Mr. SMITH. You have abandoned this pneumatic dynamite battery scheme entirely, have you not?

Colonel ABBOT. Yes; but we have saved the money, and gave it back to Congress, so if Congress will give it back to us we will be very much obliged.

Mr. SMITH. Then we might just as well regard this as an estimate for improving the powder service?

Colonel ABBOT. Absolutely so. It gives us a little excuse, as we are asking to have it returned to us.

Mr. GRAFF. As a reward for virtue.

Mr. FITZGERALD. Did you say, Colonel, that you are now contemplating improvements in the method of delivering the powder?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. Has not that been part of the work that has been done heretofore out of this appropriation?

Colonel ABBOT. No, sir; that was the projectile service. The projectiles are so heavy that they have to be carried by power anyway,

but the powder being put up in 100-pound packages could be carried by man power, and until they increased the rate of firing, it has answered reasonably well. Now they require so much powder in such a short time that it calls for a mob of men to carry enough powder to enable the artillery to fire the guns as rapidly as they can, with aimed shots, and doing good hitting. We have to improve the powder service beyond anything that was ever anticipated when the batteries were first built. The artillery have learned that they can use the guns much more rapidly than was ever dreamed beforehand.

Mr. FITZGERALD. That is, in practice, but do they expect to do that in actual service? Recently the Chief Constructor in the Navy criticised the target practice of the Navy in this respect, that they were, in practice, establishing a rate of fire that was never contemplated could be equalled in time of war. Now is not that largely true with respect to the firing of these guns from fortifications?

Colonel ABBOT. I should not want to give an opinion on that, because it is purely an artillery administrative question. They tell us that they will be able to fire those guns at that speed, and they are actually doing it in target practice, and making magnificent records. One difference between the Navy and the Coast Artillery is this, that the Coast Artillery can begin their battle firing at vastly greater ranges, on account of the perfection of their range finding system; and they are consequently firing at the approaching vessels for a considerable time without being fired at themselves. Under those conditions I do not see why they should not reach, in time of war, the same speed of firing that they use in target practice, because for a time, they are not disturbed by the hostile fire.

Mr. FITZGERALD. If I recall, they are carrying the projectiles on trucks to the guns. Do they take the powder bags out in the same way from the magazine?

Colonel ABBOT. They expected to do that, to carry it on the side of the powder truck, but some years ago it was found that the projectile and the powder going up on the same hoist was excessively dangerous at any such speed as they then used. The powder bags would get between the projectiles and be crushed, and there would be liability of an explosion. So it became absolutely necessary to separate the powder from the projectile service; but that was discovered about 3 years ago. Accordingly, at the request of the Chief of Artillery, an order was gotten out prohibiting the use of the projectile hoist for handling powder, and requiring that the powder should be taken to the gun by hand. That has been the case now for several years.

Mr. FITZGERALD. In the use of these disappearing carriages, is not the ammunition stored in magazines on the same level with the guns?

Colonel ABBOT. No, sir, it is stored on the lower floor, and all has to be lifted.

Mr. FITZGERALD. What proportion of this appropriation is to be expended in the replacing of the surface of the emplacement, and what proportion in installing new machinery?

Colonel ABBOT. You have two appropriations combined. The Preservation and Repair is the one we use to *replace* damaged items—we widened the platforms of the older batteries so as to give room for the ramming of the projectiles and paid for this out of modernizing funds.

Mr. FITZGERALD. Out of that appropriation has been expended, according to the hearings had in the last two sessions of Congress, first, where the cement has eroded from the fire of the guns; that has been done out of this appropriation.

Colonel ABBOT. Out of modernizing older emplacements?

Mr. FITZGERALD. Yes.

Colonel ABBOT. Some of it may possibly, because in the working of the new widened platforms of course we have to replace whatever has been knocked out before; but the general division that has been actually made in allotting the funds is to make repair of existing structures out of the Preservation and Repair Appropriation, and the betterments out of Modernizing Older Emplacements. Of course there are places where two allotments might go in together, but generally they are made in that way.

Mr. FITZGERALD. The hearings of the first session of the 59th Congress show that from the firing of the guns the cement had been cracked and water got in, there were pieces broken out of the cement and that you replaced it out of this appropriation.

Colonel ABBOT. Was it not out of Preservation and Repair?

Mr. FITZGERALD. I will read it out of your own testimony, that given in the first session of the 59th Congress, under the heading of Modernizing Old Emplacements. Major Abbot said:

The injury is not serious, but the looks of the batteries are impaired, and that attracts the attention of inspectors every time they see it. It looks ragged to have broken up slopes and embankments around the guns, and numerous official protests and complaints follow. As to the effectiveness in time of war, there would be practically no effect. With the passage of time and the action of frost the upper surface of the injured parapet would be disintegrated, unless the surface was maintained so that the water could run off. The frost would penetrate and the freezing would crack the cement so that these breaks certainly ought to be repaired. When the Rosendale top layer is replaced with Portland cement concrete in sufficient thickness it protects all the rest of the Rosendale concrete parapet below.

Mr. SMITH. You see we are simply trying to find out how pressing that is.

General MACKENZIE. You see that is only a portion of the work that comes under this item. The other point is improving the delivery of ammunition to the guns.

Now what proportion?

Colonel ABBOT. A very small proportion has gone to that general repair work. I am speaking of the actual allotments as they have been made at my desk. There is but a small proportion of Modernizing Older Emplacements funds that has gone into anything excepting *bettering* the conditions at these older emplacements. I have endeavored to use Preservation and Repair, so far as I could, for *keeping* batteries in the *present* condition. That is the broad line of distinction we have tried to make between the two.

Mr. GRAFF. As to this hoisting apparatus that you propose now, has that been used before in connection with batteries?

Colonel ABBOT. The powder hoisting? We are just developing it now. We have two types tested, and have finished devising machinery of a 3d type in Baltimore. One of them is installed for test by troops at Fort Howard, and the second one will be installed there in a few days, and the third will be soon erected and tested at the factory by myself, prior to its installation in some battery for test by the troops.

Mr. FITZGERALD. You say that the powder is now carried up from below by hand?

Colonel ABBOT. Yes, sir, in all the forts excepting the one at Baltimore, where we put in the first experimental powder hoist. It has just been completed, and I have recently been over there to test it.

Mr. SMITH. About what does it cost?

Colonel ABBOT. I can give you that later. I know that it is a satisfactory type.

Mr. GRAFF. What is the motive power used?

Colonel ABBOT. Electricity.

Mr. SMITH. Can you not give me some idea of the cost, whether it is \$10,000 or \$100,000?

Colonel ABBOT. The cost of the first experimental hoist has been about \$1,500. The cost of the installation at Fort Howard has been about four hundred dollars only; but there are fortifications where it will cost much more to put it in. We had a good place for it at Fort Howard.

Mr. FITZGERALD. One for every gun of the battery?

Colonel ABBOT. An individual hoist, that is, one for each gun.

Mr. SMITH. How many guns are there to be supplied ultimately?

Colonel ABBOT. The heavier guns are the only ones in which it is essential. I do not think there is any need of putting in a powder hoist at the 8-inch guns, but all the 10 and 12-inch guns ought to have them.

Mr. SMITH. About how many of them are there now?

Colonel ABBOT. There are 105 12-inch guns, and 122 10-inch guns.

Mr. SMITH. So that, as a matter of fact, so far as this proposed transfer from the pneumatic dynamite batteries plan is concerned, this will not go very far?

Colonel ABBOT. No, it will not cover the whole thing, but it is a step in that direction. We did not make that as a total estimate for finishing, as we do not like to base an estimate upon something that we do not know about fully, at the same time it is surely something that ought to be put in, under the present conditions.

Mr. GRAFF. What are they made of, iron or steel, or what?

Colonel ABBOT. One of them is a small hoisting winch operating two parallel chains with suspended carriers between them; the second machine is more like a belt conveyor. Naturally with powder you have to take precautions that are not needed in carrying coal, so that it is a more expensive piece of machinery. The first one will cost \$1,500, subsequent ones will cost less, as we have been able to eliminate some expensive features.

Mr. SMITH. How long will they last?

Colonel ABBOT. Indefinitely; they will need repairs of course, but they will last a long time. The last one, type No. 2, I tested in Baltimore last week, and it will deliver 100 pounds at the top at about second-and-a-half intervals.

Mr. SMITH. Is that for a 12-inch gun?

Colonel ABBOT. Yes.

Mr. SMITH. How rapidly can they deliver this powder now?

Colonel ABBOT. They actually fire guns at present, by putting many men at work carrying the powder upstairs, the 10- and 12-inch guns are fired about once every minute in target practice; but that means getting ammunition ready beforehand.

Mr. SMITH. And you want to deliver the powder as fast as they can do it.

Colonel ABBOT. The two new machines do, but it is nearly the maximum that can be done safely.

Mr. SMITH. Is there not as much danger in getting it up so rapidly as there is in taking the chance in sending it up with the projectile?

Colonel ABBOT. No; we can provide important safeguards. For instance, at the upper end when the supply table is full, the table tips and stops the whole machine, so that no more powder can come up. That is done by the weight of powder resting on the table at the upper end. When the maximum number of bags that can be accommodated safely are there, it stops the machine automatically. If the artillery does not take the powder away the hoisting apparatus simply stops feeding in consequence. There is a third type that is nearly finished, which is especially designed for the older forms of emplacements. It will probably be very much cheaper both to build and to install than the other two, but we have not tried it yet.

Mr. SMITH. They have developed in practice to the firing at the rate of a shot a minute with 12-inch guns?

Colonel ABBOT. Yes, they have got it down to a half minute in some cases, but a shot a minute we must surely come up to, and that is 400 pounds of powder every sixty seconds.

Mr. SMITH. And the estimated life of the gun is about 100 rounds?

Colonel ABBOT. Not at the present velocity; it is much more than that. With the 1900 model at full power, sixty rounds was all it could stand, but the decrease in velocity increases the number of rounds, so that the life of the gun increases indefinitely, depending upon how much the velocity of projectiles is decreased.

Mr. SMITH. We had it up to 2,200 feet a second.

FIRE-CONTROL STATIONS AND ACCESSORIES.

Mr. SMITH. As to this fire-control item, the money appropriated under this head is apportioned by the Secretary of War under what branches of the service?

Colonel ABBOT. Engineers, Ordnance and Signal Corps.

Mr. SMITH. What amount of the \$900,000 that you got last year was allotted to engineers?

General MACKENZIE. \$432,784.81.

Mr. SMITH. Have you any unexpended balance under this last item of Modernizing Old Emplacements?

Colonel ABBOT. Under date of December 1st, 1907, there was \$124,366.58, of which \$10,785.95 had not been allotted. That \$10,785.95 is in the Treasury ready to apply, the rest is all pledged. That is under Modernizing Older Emplacements.

Mr. SMITH. Where was the money spent under this Fire-Control item, out of this last year's appropriation?

Colonel ABBOT. Most of it at San Francisco.

Mr. SMITH. How about Puget Sound?

Colonel ABBOT. Puget Sound was mostly provided for from the previous Acts, but there was a little lapping between the two acts.

Mr. SMITH. What do you say as to the completion of the fire-control stations on the Pacific Coast now?

Colonel ABBOT. Puget Sound will be completed. San Francisco will possibly be completed from the funds already appropriated, but we are not far enough into it to be perfectly certain about that now.

Mr. SMITH. The entire estimate, as suggested in your note in the book of estimates is for Atlantic Coast Forts this year?

Colonel ABBOT. That is selected by the Chief of Artillery, and we made our estimates to correspond with what he said he wanted done.

Mr. SMITH. But you have no estimate for anything upon the Pacific Coast, is that true?

Colonel ABBOT. That is right.

Mr. SMITH. This estimate covers Narragansett Harbor, the entrance to Long Island Sound, and Hampton Roads?

Colonel ABBOT. Yes.

Mr. SMITH. Does this cover the installation of fire control for any of these projects on the east coast that you have in the bill; that is, is it for existing guns exclusively at these points, or does it include fire control for these projects that you have in the bill for the eastern coast?

Colonel ABBOT. It is very largely for existing batteries. It would, however, at the eastern entrance to Long Island Sound cover those batteries for which we have no site at the present time. At Narragansett Bay it would be only for existing batteries, and the same at Hampton Roads. At the eastern entrance to Long Island Sound, the figures being taken directly from the Taft Board report, cover all guns projected by the Taft Board, including those for which we are not going to be able to build emplacements this year on account of lack of sites, that is, those for which we have not asked funds.

Mr. SMITH. Would it not also include the new work estimated for at Hampton Roads?

Colonel ABBOT. There is no new work at Hampton Roads or at Narragansett Bay.

Mr. SMITH. Do you not consider the fire control in a fair state of efficiency at Narragansett Bay now?

Colonel ABBOT. No, sir; they are making the most crude attempts. At Battery Greene they have a wooden tower, and the stations at other forts are largely small shanties built from old boards and remnants; the artillery have never yet given us the complete scheme at Narragansett Bay; I believe it has never been worked out yet in detail.

Mr. SMITH. Don't you think it is rather early to estimate the cost of installation before you get a proper scheme?

Colonel ABBOT. The Taft Board had a detailed scheme in their minds when they made the estimate, but we have never had the officially approved artillery scheme for Narragansett Bay given to us. The Taft Board estimates were made on the best plans that they could get up at that time. Experience with fire control matters has enabled them to improve and cheapen, so that we have actually got through at New York for about the estimated cost. At Boston we will probably be through for considerably less than the estimated cost. At Portland it will be about the estimated cost. At Puget Sound it looks as if we might make a considerable saving. At San Francisco it is a little too early to be certain, but I think we can get through for what you gave us, which is much less than the estimated cost. Not having anything excepting the general plans on which the Taft Board's estimate was based, I can not give you close esti-

mates as to Narragansett Bay, excepting that there is nothing done there yet to amount to anything.

Mr. SMITH. What have you at Hampton Roads now?

Colonel ABBOT. The system that was put in prior to the maneuvers about three years ago; experience has indicated that it needs a good deal of modification.

Mr. SMITH. How did you reach the figures? Did you take them from the Taft Board report too?

Colonel ABBOT. Yes, sir. These figures are what the Chief of Artillery asked us to submit.

Mr. SMITH. Has the Chief of Artillery furnished any detailed plan?

Colonel ABBOT. Not yet; they no longer give us a detailed approved system for every harbor in the United States, but when they came to actually putting in the standard system at a harbor they modify and change the Taft Board plans to conform with the latest developments, and the work is thus done equally well with a less number of communications.

Mr. SMITH. Would you not then regard the Taft Board's estimates as unreliable now?

Colonel ABBOT. They have proved reliable at two places—practically at three places—and at the other two places we will get through for less.

Mr. SMITH. But I understood you to say that the plans, since the Taft Board work was done, had been so modified that the estimates would probably not be—

Colonel ABBOT. The last plans that they gave us were Puget Sound and San Francisco, and apparently we will get through for much less than the estimated costs; there probably may be a saving over Taft Board figures, though it is pretty hard to tell.

Mr. SMITH. Now do I understand that if we do not give you any appropriation for the fortifications at the eastern entrance to Long Island Sound, would all of the Long Island fire control go out, or only a portion of it?

Colonel ABBOT. We have given in these tables what we would do with the money if you give us all we ask for. If you do not give us all we ask for, we always do the best we can in that general line.

Mr. SMITH. But you do not understand me. You told us a moment ago, if I understood you correctly, that the estimates for the eastern entrance of Long Island Sound included the installation of fire-control for batteries that do not exist. Suppose we decided not to give you those batteries.

Colonel ABBOT. That it would not prevent us completing the fire-control for the existing batteries. We have never put in stations for nonexistent batteries.

Mr. SMITH. How much would it require for the existing batteries?

Colonel ABBOT. A pretty large proportion of the amount.

Mr. SMITH. Can you not give me something more definite than that, as to how much it would cost for the existing batteries?

Colonel ABBOT. Not in detail, here.

Mr. SMITH. But in gross. How are we to estimate it if we decide not to give you anything for new fortifications?

Colonel ABBOT. Do you mean how much can you reduce the total estimates without probably putting us out of relation with the Ordnance and Signal Corps?

Mr. SMITH. We do not want to appropriate a dollar this year that is not absolutely essential. It is highly probable, in my judgment, that the appropriation will not be made for the fortifications at the eastern entrance of Long Island Sound this year. I do not know what the Committee will decide, but we do not want to give you money for fire control for forts that will never be built.

Colonel ABBOT. We have not here the subdivisions of these items in sufficient detail to answer; they are at my desk. The engineer cost of the total fire control is about \$7,000,000 out of the \$9,000,000, so that about seven-ninths, or perhaps two-thirds of the total would go to the engineers.

General MACKENZIE. The problem is, how much that would be reduced in case these new batteries are not built.

Colonel ABBOT. We can give you that, but it will have to be figured up.

Mr. SMITH. In going over the proofs of your hearings, I wish you would fill in how much of this estimate for the eastern entrance to Long Island Sound is for existing batteries, and how much is for batteries in contemplation.

Colonel ABBOT. I can do that easily. The estimate submitted for "Fire Control at Fortifications," as printed in book of the estimates, included \$762,775.00 for the defenses of the eastern entrance to Long Island Sound. This is the amount of the estimate of the Taft Board for the work of the Engineer and Ordnance Departments and the Signal Corps for a complete installation at this locality, including batteries not yet constructed. Of this total amount, the sum of \$538,344.00 was estimated for the Engineer work, of which amount \$266,200.00 was for the service of batteries not yet constructed, leaving the sum of \$272,144.00 for the Engineer work for batteries now in existence.

Mr. GRAFF. The whole estimate is for existing batteries excepting at the eastern entrance of Long Island Sound?

Colonel ABBOT. Yes.

Mr. SMITH. In this estimate you have stricken out, "operation and maintenance."

Colonel ABBOT. That is the Signal Corps portion of it. The Signal Corps has been paying for operation and maintenance out of the construction funds appropriated by Congress for fire-control, and this year that item comes in at another place, and the amount is dropped out of this part of the appropriation, so that the actual cost of the installation of the fire-control system will be all that is charged to the construction appropriation, instead of including also upkeep.

Mr. FITZGERALD. Is Puget Sound entirely provided for?

Colonel ABBOT. Yes, we hope it will be.

CURRENT FOR POWER AND LIGHTING AT SEACOAST FORTIFICATIONS.

Mr. SMITH. The next item is an entirely new item for supplying current for power and lighting at seacoast fortifications, \$1,000,000. Out of what various items of appropriation have such expenses as are covered in this item heretofore been paid?

Colonel ABBOT. They have been paid out of the construction funds; small electric plants are part of batteries as now built, but the older batteries plans did not provide them, so that it becomes neces-

sary to supply to a great many old batteries electrical installations which are now put in new emplacements at the time of their building.

Mr. SMITH. It was paid out of construction of gun and mortar batteries?

Colonel ABBOT. Yes; they are parts of the batteries. The electrical plant is in the battery to supply power to the hoists as well as light. In the old ones we ran projectile hoists by hand power.

Mr. SMITH. Then it is entirely covered by Gun and Mortar Batteries, or Modernizing Older Emplacements?

Colonel ABBOT. It could go into either place.

Mr. SMITH. How does it come that you thus start off with a million dollars for what has already been carried every year under one or the other of these headings?

Colonel ABBOT. At the time its report was made, the Taft Board inaugurated the policy of dividing these power plants from emplacement construction in their estimates, on page 23. They estimated for the guns, carriages, and emplacements jointly, and also for power plants, both central and reserve. It was a new style of bookkeeping practically. What we want this million dollars for is modernizing old emplacements more than anything else, because it is very largely supplying these things for the older batteries.

Mr. SMITH. How much could be omitted from the \$242,500 item for Modernizing Older Emplacements? This is a supplemental item that is very much larger than the original one.

Colonel ABBOT. We had not considered that \$1,000,000 as an item of modernizing in our estimates, that is all. The Taft Board estimate for electric plants covers two items, if you will notice, in the table on p. 23, one for the central power plant and one for the reserve. There had always been a little doubt, certainly in the mind of the Engineer Department, as to which was the best policy, whether to put in a large plant for the post, and divide the expense with the Quartermaster's Department, or whether to put small plants, separate from the post entirely, for the batteries, to attend to the purely military field. The Taft Board took that point up and decided that both were needed.

Mr. SMITH. Have you any figures showing what has been the cost of producing the current? I believe the standard is now called a kilowatt-hour, is it not?

Colonel ABBOT. Yes, sir.

Mr. SMITH. Have you any figures showing what has been the cost of the production of current for these seacoast batteries?

Colonel ABBOT. No, and I do not think it can be worked up accurately for the past. Coal and oil are supplied by the Quartermaster's Department; other items in connection with machinery proper are supplied by the Engineer Department, and I do not know whether the Quartermaster has kept the coal and oil accounts separate from other port items or not. I can tell you the exact amounts that we have paid. That comes out of the item for Supplies for Seacoast Defenses.

Mr. SMITH. Do you buy current of some other branches of the service, or from commercial companies?

Colonel ABBOT. The Quartermaster does, buys it from commercial parties at some places. We do not buy current for emplacements,

but the Q. M. Dept. supplies the coal to run our plants with, and the labor is partly that of enlisted men.

Mr. SMITH. What I want to get at is this. There has been great complaint of the outrageous extravagance of the government in electric-light plants, and of the extortionate figures which we pay for current when we use it. It has been charged that your department is responsible, and that it costs about twice as much as you can buy it for. What I want to know is whether it is not feasible, in almost all cases, to buy current, and to simply have the reserve electric-light plant in place of having one running all the time, and a reserve plant too.

Colonel ABBOT. To buy from the Quartermaster?

Mr. SMITH. From a commercial company.

Colonel ABBOT. A great many of the forts are nowhere near any commercial company. At Fort Casey they captured a deer on the parade ground. Four of them were located there and the troops surrounded them. At Fort Worden it is the same way, and it is not in reach of anything.

Mr. SMITH. How many miles to the nearest commercial electric lighting plant is it?

Colonel ABBOT. Fort Casey is on Whidbey Island, and you would have to have a submarine cable to carry current there.

Mr. SMITH. Then you have not many forts near a commercial supply?

Colonel ABBOT. There is at Fort Taylor at Key West.

Mr. SMITH. Have you made efforts to ascertain how many places you could get current cheaper than you could produce it?

Colonel ABBOT. No, where we do get it the Quartermaster supplies it, and we do not handle it. We cannot purchase it, because our duty as a constructing department does not cover the purchase of the manufactured product.

Mr. SMITH. So that if we want to know about this in detail we ought to ask the Quartermaster about it?

Colonel ABBOT. He would be more nearly able to tell, or the Chief of Artillery. He has reports made by his officers which perhaps may give the cost.

Mr. SMITH. I notice it is stated here that the National Coast Defense Board estimates that \$5,216,031 will be required to furnish the necessary electrical equipment for the defenses of the United States in addition to the current required for searchlights. That was made February 1st, 1906.

Colonel ABBOT. Yes, sir.

Mr. SMITH. It was never at any time called to the attention of Congress or an appropriation asked for until now.

Colonel ABBOT. Until now, yes, sir, except on p. 235, book of estimates for fiscal year ending June 30, 1903, under heading searchlights, where \$500,000 was submitted for "Installation of post mains and conduits."

Mr. SMITH. It can not be regarded as a very emergent item, when it has not been mentioned for two years to Congress.

Colonel ABBOT. We are managing to get along with a lot of plants that are getting older every day, and the emergency is becoming greater to replace the older plants with bigger ones. A very good illustration of that is at San Francisco. I was there about six weeks

ago. The batteries are lighted by oil engines and dynamos that were put in years ago, and when we operate the projectile hoists to raise the projectiles, we have to put out the lights, to get current enough to take the projectiles up. There is not power enough in the engines to meet the new requirements.

Mr. SMITH. That would be a place where you could get commercial current, could you not?

Colonel ABBOT. I do not believe we could on the north shore. On the south shore we undoubtedly could.

Mr. SMITH. How is it on the north shore; is the electric equipment there as bad?

Colonel ABBOT. Just about the same. At Fort Barry we haven't any electrical equipment. There the batteries are dark, and we are using hand power to lift projectiles.

Mr. GRAFF. I do not quite understand your reply in regard to the policy of maintaining a separate electric plant for the batteries. Do you mean for the Quartermaster to maintain a separate one for the troops, or to have one large plant for both? As I understand it, the Taft Board recommended both.

Colonel ABBOT. Yes, that is what they recommended.

Mr. GRAFF. And then a plant as a reserve?

Colonel ABBOT. As a reserve. The trouble with a central plant is that when a shot hits it it puts the whole defense in darkness. It is most likely that if there ever is an attempt made by a fleet to actually pass sea coast batteries, it will be at night.

Mr. SMITH. Is not that the advantage of having a commercial current in place of your own? If you have the current brought in by conduit from a near-by city, there is far less chance of their being put out by the enemy than with your own plant?

Colonel ABBOT. I doubt it, because conduits are not bombproof, they are carried only a short distance underground. If anything happens to it due to hostile shots or otherwise, it cuts off the supply entirely.

Mr. SMITH. They are as reliable as the fire-control conduits, are they not?

Colonel ABBOT. Yes, but the fire control is intended to be utilized at the longer ranges. When ships get in far enough to begin shooting with effect then the coast guns will be fired in the old way. Fire control, as I said earlier, is designed largely to enable the artillery to destroy a naval fleet before it gets near enough to shoot at them at all, because the position of the fleet can be so accurately determined at long ranges by the land range-finding system.

Mr. SMITH. Do you say that the fire-control system on land is much more perfect than the range-finding system at sea?

Colonel ABBOT. Necessarily, because we have fixed stations.

Mr. SMITH. And a long base line?

Colonel ABBOT. Yes. You cannot use on a moving station such high-power telescopes as you can use at a fixed station.

Mr. SMITH. Then it has become much more valuable on shore.

Colonel ABBOT. We always have had some system of range finding on shore, but never as complete as now.

Mr. SMITH. Prior to the last ten years it was simple, was it not?

Colonel ABBOT. It was comparatively simple, yes.

RECLAMATION OF LAND FOR LOCATIONS OF FORTIFICATIONS.

Mr. SMITH. For the procurement and reclamation of land, or right pertaining thereto, needed for the site, location, construction or prosecution of works for fortifications and coast defenses. Have you any balance still unexpended under this head?

Colonel ABBOT. Practically none. There is a question of the completion of the purchase of a site up at Fort Stark. The money has not been paid, but it is all tied up by condemnation proceedings, so that we practically have no money.

Mr. SMITH. Now, as to where you will need more sites. At what points do you regard as the emergency sites now in continental United States, in the procurement or reclamation of land? Please give them in the order of importance as you regard them.

Colonel ABBOT. Eastern Plain Point, Long Island Sound.

Mr. SMITH. In connection with the eastern entrance of Long Island Sound?

Colonel ABBOT. Yes, sir, to close the channel between Plum Island and the shore.

Mr. SMITH. How much is that?

Colonel ABBOT. That is \$50,000. The next item depends upon whether we are going to defend Chesapeake Bay. These are put approximately in the order of the Taft Board recommendations. The next one is San Francisco, California, at Fort Miley, where they estimate \$250,000; there have been very insistent requests from the garrison for the increasing of the area of that reservation. One of our batteries is right at the back end of it, and the other at the front end, and they really need considerable land there to keep intruders from endangering the batteries from the outside. The land is expensive, and the estimated cost to get what is absolutely necessary, according to the inspector's report, is \$250,000. San Francisco has probably one of the best defended harbors that we have at the present time, it would be convenient if we had this money, but we have gotten along a good many years without it.

Mr. SMITH. Then as to this San Francisco matter you do not regard it as urgent?

Colonel ABBOT. No, although it is very much desired by a great many people.

Mr. SMITH. This eastern end of Long Island Sound could hardly be regarded as emergent unless we put up the fortifications?

Colonel ABBOT. That is right. There are a couple of sites at Puget Sound which I think we certainly ought to get money for; the estimates are \$40,000 and \$8,500. Those are the district officer's figures, and I am afraid they are insufficient. I have been out there, and it looks to me as if the land would cost more than that.

Mr. FITZGERALD. Have you got anything there now?

Colonel ABBOT. Not a cent; out of funds.

Mr. FITZGERALD. There is nothing required at Boston for additional sites?

Colonel ABBOT. Nothing. We bought, at Boston, the Deer Island site the last time with the balance of our funds, which gives us the site on which to put batteries to close this new channel.

Mr. FITZGERALD. So if we gave you anything on the condemnation for sites, taking into consideration the length of time of the con-

demnation before you can go to work, would you regard this \$50,000 at Eastern Plain Point as the first thing to do?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. Then you would regard the second thing, if not the first, as Puget Sound, and that would cost about \$50,000 more?

Colonel ABBOT. In other words, if you would give us \$100,000 I should understand it would mean that we would try to get the Eastern Plain Point site and the Puget Sound sites.

Mr. FITZGERALD. You spoke about Deer Island sites. Quite a storm has been raised over in Boston, has there not, upon the suggestion of putting a battery there?

Colonel ABBOT. Not that I know of, no, sir.

Mr. FITZGERALD. Where were they objecting to putting it?

Colonel ABBOT. I have not heard of any such storm.

General MACKENZIE. I have not heard of anything lately. Of course, there are certain penal institutions on Deer Island, and objections were originally made about the firing of the guns.

Mr. FITZGERALD. They have there some kind of an institution I think.

General MACKENZIE. A woman's prison.

Mr. FITZGERALD. And the objection is from the firing?

General MACKENZIE. The firing, yes, sir.

Colonel ABBOT. And the matter was all practically agreed on. We paid \$250,000, and they agreed to build a wall across the island between the woman's prison and the artillery post. It is all satisfactory now there, as I understand it, unless there is something very recent.

PURCHASE AND INSTALLATION OF SEARCH-LIGHTS.

Mr. SMITH. I notice in the next item, that you ask for \$1,000,000 for search-lights for the defenses of our most important harbors. Has the condition materially changed as to search-lights since you last gave us quite an extensive explanation of the matter?

Colonel ABBOT. We have bought a good many, and we have learned a good deal. We know a great deal more about what we want, and we are satisfied we are getting better material than we were a year ago. But it is in the same line, and we certainly know that if we are going to have night fights, we must have search-lights.

Mr. SMITH. How are you equipping the search-lights on the Pacific Coast?

Colonel ABBOT. If they utilize out there all the lights that are being bought those harbors will be perhaps about half fitted up; but if it is distributed around the rest of the United States, we will have money enough to supply enough lights to make San Francisco and Puget Sound fairly well lighted at night, but Columbia River would not be able to get much attention at this time. San Diego will not have anything more than one 36-inch light.

Mr. SMITH. What would you say would be the adequacy of a renewal of last year's appropriation for this purpose to fairly well equip the Pacific Coast?

Colonel ABBOT. I think it would be putting the Pacific Coast in good shape, but it takes a long time to get these search-lights.

Mr. SMITH. How long?

Colonel ABBOT. We have had to wait six or eight months for a single mirror.

Mr. SMITH. So that it is within the discretion of the Department now to practically allot for the Pacific Coast what money you have?

Colonel ABBOT. Nevertheless we should make a fair apportionment, not leaving the rest of the country very poorly cared for; that is, Puget Sound and San Francisco, and the mouth of the Columbia River will not be efficiently lighted, unless we get further funds.

Mr. SMITH. Suppose we gave you what we gave you last year, which was \$210,000. That would give you, in unmounted searchlights, if so disposed, an abundant supply for the Columbia River and Pacific Coast Points?

Colonel ABBOT. Yes, sir, ignoring all other harbors.

Mr. GRAFF. This appropriation for search-lights does not apply to the insular possessions?

Colonel ABBOT. No, sir; there is a separate item for the insular possessions.

Mr. SMITH. Generally speaking, no item in the body of the bill is for utilization in the insular possessions?

Colonel ABBOT. No, sir.

Mr. FITZGERALD. Is there any unexpended balance in that fund?

Colonel ABBOT. Yes, sir; quite an unexpended balance at this time.

Mr. FITZGERALD. How much does it amount to?

Colonel ABBOT. We can utilize it in contracts in a very short time now. We had under date of December 1, \$15,061.23. That was all available. A great deal of the money is not paid out, but the contracts have been made pledging it.

Mr. FITZGERALD. That amount is unallotted?

Colonel ABBOT. This amount is available for allotment. There was unallotted on Dec. 1, 1907, \$86,796.90, which was subsequently pledged, however, for the purchase of some searchlights from the Navy.

Mr. GRAFF. What is the amount unallotted?

Colonel ABBOT. The money which is not covered by obligations, and not covered by different contracts, is \$15,061.23.

Mr. FITZGERALD. What is the total estimated cost for the searchlights, \$7,000,000, I think?

Colonel ABBOT. It is not totaled here. The items all appear in the Taft Board's report, Senate Document No. 248, 59th Congress, first session.

PROTECTION, PRESERVATION, AND REPAIR OF FORTIFICATIONS.

Mr. SMITH. Under the head "For the protection, preservation, and repair of fortifications for which there may be no special appropriation available," you ask an increase of \$100,000?

Colonel ABBOT. Yes, sir; we need that amount.

Mr. SMITH. In what respect do you think the fortifications are neglected aside from modernizing?

Colonel ABBOT. We have very many different emplacements scattered over such a very large area. It is very difficult to keep up general repairs to look after parapets where earth slides occur or rains wash gullies, to keep emplacements painted and whitewashed, drains open, iron work free from rust, machinery in condition, etc.

Then, things break and get out of order. \$200,000 is not sufficient, in my opinion, to keep the emplacements in as good shape at the end of the year as at the beginning. Where you have a large plant and much money invested I think it is good policy to keep it up.

Mr. SMITH. Does much of this work deteriorate merely on account of neglect?

Colonel ABBOT. The machinery certainly, if it is not repaired at the right time, is often very seriously injured. We have not coast artillery enough to man all the places. There is a lot of stuff that we have to keep in repair and it takes an immense amount of money to do so.

Mr. SMITH. What have you distinctly in mind now that is neglected under your annual appropriation of \$200,000?

Colonel ABBOT. Every one of the district officers each year makes an estimate of what he thinks will be needed to keep the batteries in proper condition during the coming year. The estimate is generally submitted in form showing what items they want to attend to in the way of repairs, and those estimates year after year will aggregate not less than \$500,000. I go over those reports and strike out, in the first place, all the items which are so large that we can not evidently do them, and then strike out many important items which ought to be done in order to keep things in the proper shape, and even then I have to go over the lists and leave out "essentials" before I can get the allotments down to \$200,000.

Mr. SMITH. You visited a good many of these places during the last year?

Colonel ABBOT. Yes, sir.

Mr. SMITH. Did you see at any of them any deterioration that you thought was going on that was a loss to us that could not be rebuilt next year at the same price?

Colonel ABBOT. Battery buildings want paint. We are in receipt of many complaints from the inspectors that at the different posts engineering buildings are a disgrace to the service. We use up all the money for preservation and repair of the batteries and our buildings do look disgraceful. They should be painted, but we can not use money for painting where we have machinery and ordnance material which requires care and watching. We have to pay a great deal for watchmen.

Mr. SMITH. To what extent does this lack of painting permanently injure the buildings?

Colonel ABBOT. The wood rots and decays.

Mr. SMITH. How many of the buildings are wooden?

Colonel ABBOT. All of them; our quarters, our mess houses and things of that kind. In many harbors we carry laborers to isolated ports on steamers, and put them ashore to remain for some time; we must have a mess house and a bunk house while the men are at work. We have to do that at all of the isolated forts.

Mr. SMITH. If this work is not done will the repairs next year cost more?

Colonel ABBOT. Yes in many cases; take, for instance, a boiler, when boiler tubes begin to get thin we ought to have funds to replace them at once before an explosion occurs; steam piping acts in the same way. When that begins to get rusty it should be replaced also for the safety of the men working around the machinery. There is a

steam boiler used at the mouth of the Columbia River which I am afraid all the time will blow up. I looked at it the last time I was there. To replace it will cost \$2,100, and the balance of the appropriation is now exhausted.

Mr. SMITH. To what extent has the property that is involved in this repair fund increased in the last few years?

Colonel ABBOT. It has increased by all the machinery which we have put in, by all the new batteries which we have erected and very largely by the immense number of small buildings which we have put up for fire control, which is an integral part of the defense system. Then the tin roofs rust, then tar and gravel roofs get dry, crack, and then admit water, and then canvas roofs rot and then leak if not kept well painted.

Mr. GRAFF. Do you have watchmen?

Colonel ABBOT. Yes, sir; we have many, many watchmen. There are many places where the artillery has not been able to provide the men.

Mr. SMITH. Care takers?

Colonel ABBOT. Yes, sir; or engineer watchmen. Until we turn over a battery to the troops we have to take care of it, of course, and when we finish a battery the expense of construction ceases. We pay for the preservation of it out of this appropriation for preservation and repair.

Mr. SMITH. You have substantially expended the \$200,000?

Colonel ABBOT. Practically the whole amount is covered at this time of this year, by allotments.

Mr. FITZGERALD. You will remember that we reduced the appropriation in 1907 because you were accumulating quite a balance. What is the unexpended balance in this appropriation?

Colonel ABBOT. On December 1st we had an available balance of \$169,619.87, which has to cover the expenditures from December 1st until the next bill is law. The money is in the hands of district officers and a great many items have not been touched at all for fear that emergency needs might arise if the whole balance was spent so early in the year.

Mr. SMITH. This year the appropriation will cover very much less than a year, because the next appropriation will be available not later than March 4?

Colonel ABBOT. Yes, sir; and if we get the \$300,000 we will only be able to do what we should have done already this year, and have had to leave undone for lack of funds.

Mr. FITZGERALD. In the first session of the 59th Congress there was \$189,000 and the Committee then decided that if you could save about \$100,000 out of the \$200,000 there would be an accumulation of \$200,000 which would be sufficient?

Colonel ABBOT. It is necessary for each officer to hold in his hands a considerable balance to guard against storms and other conditions likely to occur. So we do not dare to expend the last cent we have in this fund. A great deal of this amount must be held to cover the salaries of watchmen and things of that sort and we must have on hand at the time we come before Congress enough money to keep us going safely until the next appropriation will be available. It is necessary to carry a certain amount, divided up among a great many places, and it leaves very little at any one place to be available.

CONSTRUCTION OF WALL, FORT MOULTRIE, SOUTH CAROLINA.

Mr. SMITH. The next item is, "For the construction of about 4,800 linear feet of wall necessary for the protection of Fort Moultrie, Sullivan's Island, South Carolina, from the effects of storms," \$125,000. Are you going to build that wall within the original estimate?

Colonel ABBOT. I think so, yes, sir. If you give us the balance that was unappropriated last year we will be able to finish the wall. The work done is proportionate to the estimated amount and progress has been kept up to the expenditures.

Mr. FITZGERALD. Can you use that money right away?

Colonel ABBOT. Yes, sir. We can do it much more economically if we do it right away because we have the plant on hand and a plant of that kind deteriorates all the time.

SEA WALLS, FORTS PICKENS AND M'CREE, PENSACOLA HARBOR, FLORIDA.

Mr. SMITH. You ask for the entire amount at Forts Pickens and McRee, Pensacola harbor, Florida?

Colonel ABBOT. Yes, sir.

Mr. SMITH. Will that money be used within the next year?

Colonel ABBOT. I do not know. We have had delays in getting the work started there.

Mr. SMITH. Do you not think that you could get along with less than the estimate up to the fourth of March?

Colonel ABBOT. Possibly we could. We can make a contract for the whole of the work under this authorization and I do not think there would be any trouble.

Mr. SMITH. What is the minimum amount that you could probably get along with under this item up to the fourth of March?

Colonel ABBOT. I think we could get along very nearly with what we have.

Mr. FITZGERALD. How much of the \$400,000 have you expended?

Colonel ABBOT. We have hardly gotten started. There has been some trouble with the contract and bond, and all sorts of snarls. I think we can get along with the funds we have by making a continuing contract to complete the work. The contractor may have to wait a little while.

Mr. SMITH. You have no reason to expect to exceed the estimate of last year in any of these items by reason of the storm?

Colonel ABBOT. No, sir.

REPAIR AND RESTORATION OF BATTERIES AND OTHER STRUCTURES, PENSACOLA, FLORIDA.

The CHAIRMAN. The next item is, "For the repair and restoration of batteries and other structures appurtenant to the defenses of Pensacola?"

Colonel ABBOT. We would like to have the amount of that estimate, because that work is under way and we want to finish it up. We can do that perfectly well.

Mr. SMITH. You can do that without getting the wall restored?

Colonel ABBOT. Yes, sir.

Mr. SMITH. It is not necessary to have the wall restored in order to do this work?

Colonel ABBOT. Of course it would be safer if we delayed this work until the wall was completed.

Mr. FITZGERALD. Can this work be completed so speedily that you can utilize the money?

Colonel ABBOT. Yes, sir. It is not a very large sum of money.

Mr. FITZGERALD. I am speaking in reference to all of these items resulting from the storm?

REPAIR AND RESTORATION OF BATTERIES AND OTHER STRUCTURES,
MOBILE, ALABAMA.

Mr. SMITH. The next item is, "For the repair and restoration of batteries and other structures appurtenant to the defenses of Mobile, Alabama?"

Colonel ABBOT. We are going right ahead with that work, the contract has been made and the work is progressing.

Mr. SMITH. Will you need the whole of the appropriation before next year?

Colonel ABBOT. We are liable to need it. Of course I can not tell how much the contractor will do, but the contract has been made and he ought to go ahead. The rate of progress required will cover that amount.

Mr. FITZGERALD. Do you want all of the amount estimated?

Colonel ABBOT. Yes, sir.

REBUILDING AND STRENGTHENING DEFENSES AT FORT SAINT PHILIP,
NEW ORLEANS, LOUISIANA.

Mr. SMITH. The next item is, "For rebuilding and strengthening the levees for protection of the site of the defenses and the garrison post at Fort Saint Philip, New Orleans, Louisiana?"

Colonel ABBOT. In some way or other \$40,000 was cut off the appropriation. \$140,000 was estimated and \$100,000 actually appropriated. We have cut off a part of the reservation with the money we had and the rest is now exposed to overflow. If we can get the \$40,000 we can cover the whole reservation, otherwise we can not.

Mr. SMITH. Are you sure the whole amount was \$140,000?

Colonel ABBOT. Yes, sir.

Mr. SMITH. How emergent is this \$40,000?

Colonel ABBOT. We can get along without it, but it will be better to do the work before the land actually goes under water with the next flood in the river. We have inclosed a little space, so the guns are safe. If you want to have the garrison quarters put in there this year, this amount is necessary.

Mr. SMITH. There is no hurry about that?

Colonel ABBOT. I do not know, sir.

Mr. SMITH. You are not planning to put any quarters there?

Colonel ABBOT. The Quartermaster-General was at one time figuring on filling up the reservation, but I do not know what his intention is with reference to garrison buildings.

Mr. SMITH. Your work is completed down there?

Colonel ABBOT. I do not know exactly in what shape the contract is; the work is not completed, but under way.

PREPARATION OF PLANS FOR FORTIFICATIONS.

Mr. SMITH. Your estimate "For preparation of plans for fortifications" is the same as has been submitted for many years?

Colonel ABBOT. Yes, sir; and it is absolutely needed.

Mr. FITZGERALD. Do you use that sum every year?

Colonel ABBOT. Yes, sir; we use every cent of it, and we have to allot from other appropriations to finish the work up.

TOOLS, ELECTRICAL AND ENGINE SUPPLIES AND APPLIANCES—ELECTRIC LIGHT AND POWER PLANTS IN GUN AND MOTOR BATTERIES.

Mr. SMITH. The next item is "For tools, electrical and engine supplies and appliances, to be furnished by the engineer department, for the use of the troops for maintaining and operating electric light and power plants in gun and mortar batteries."

Colonel ABBOT. We expend that amount every year. We have a little additional estimate in this year because we have been called on to supply some additional measuring instruments, which are stated to be necessary.

Mr. SMITH. You ask for no increase?

Colonel ABBOT. Yes, sir; there is a supplemental estimate of \$4,500. Since the preparation of the annual estimates regulations have been adopted which require the installation of recording wattmeters at all fortification electric plants which have been installed, with a view to their use for post lighting also, and at all other fortification plants of a capacity greater than 50 kilowatts. In order to permit the purchase and installation of these instruments, a supplemental estimate of \$4,500 has been submitted. That may be with a view to finding out what the lighting is costing.

Mr. SMITH. Does that instrument have any tendency to show what it costs?

Colonel ABBOT. Yes, sir; it shows how much current has been produced, and then you know the amount of the coal and oil. If you do not know the number of kilowatts used, the bills for the coal give no information.

Mr. SMITH. What does the Quartermaster-General charge your department per kilowatt?

Colonel ABBOT. They do not charge anything to the engineer department. When we install a post-lighting central plant, the Quartermaster's Department furnishes a certain part of the money and the engineer department builds the plant, the Quartermaster pays for the mains from the plant to the post, and the engineers pay the cost of mains from the plant to the batteries. Where the power is used for post lighting, the Quartermaster's Department pays all the running expenses, and where it is used for battery lighting only we pay part of running expenses, but draw coal and oil from the Quartermaster's Department.

Mr. SMITH. So the \$4,500 additional is made necessary in order to measure the current?

Colonel ABBOT. Yes, sir; to measure the output.

Mr. SMITH. Have you any of those instruments now?

Colonel ABBOT. No, sir. It is possible the Quartermaster may have supplied some at central plants, but all that would be carefully looked into to avoid duplications.

CONSTRUCTION OF SEA WALLS AND EMBANKMENTS.

Mr. SMITH. The next item is "For construction of sea walls and embankments." What is the present balance in that fund?

Colonel ABBOT. There is unallotted \$5,462.66 and the balance available is \$13,863.38.

Mr. SMITH. You do not mean "balance available?"

Colonel ABBOT. That is the money unexpended and unallotted added together.

Mr. GRAFF. But it is contracted for?

Colonel ABBOT. Yes, sir; some of the work is done by hired labor.

Mr. SMITH. Does the \$13,863.38 include the \$5,462.66?

Colonel ABBOT. Yes, sir; it includes the \$5,462.66.

Mr. SMITH. Are there any emergent facts other than those we have covered at New Orleans and the southern coast?

Colonel ABBOT. We have gone over the sea walls and embankments carefully. Our items are made up from the different district officers' reports. Most of them as stated last year, can be put off, but the sea is cutting in at different places. At Baltimore, Maryland, Fort Armistead, it is rather emergent because the water is cutting around behind the sea wall and it may cause damage to the wall already built. It would save money in the long run to do some work there. At Fort Heath there is a very high bank that is cutting. It is pretty near a range-finder house. The estimate is \$15,000. It would probably be cheaper to let the bank cave in and build the house further back when it caves in because the house is only worth about \$2,000, but if it does go down it will interfere with the fire-control system at Boston. It would be a good thing to put in the sea wall at Fort Heath. At Fort Schuyler and Fort Slocum, New York, the estimate is simply to continue work. At Fort Monroe, Virginia, they are very anxious to get more sea wall. We have put in a great deal. It is the Artillery School and should be kept in first-class condition. It would be advantageous if we could build the wall, but no Government property is really going to suffer without it.

At the mouth of Cape Fear River they ask for \$52,375. That is on Oak Island which was terribly washed down by one of the cyclones a number of years ago. We then put in a sea wall and then filled in behind it at an expense of \$150,000 under a special act of Congress. The supposition at that time was that if we protected the front and sides, the rear of the fill would be safe, but it has not turned out that way. It is composed of very fine ocean sand and under the heavy rains they have there it becomes full of water and sloughs out toward the inside the harbor so that it will probably be necessary sometime or other to put in a good heavy wall. When soaked the sand flows like water. At St. John's River, Florida, there is a considerable item, but we have no fortifications, simply a reservation of land. At Key West \$1500 is wanted. There is a place where there is a part of an old sea wall, which has become loose. It would be a good plan to fill that up, because if we do not fill it we will probably have to spend much larger sums in the future. That care is really preservation and repair so if you do not give us the money we can fix it out of the Preservation and Repair appropriation, if that be great enough.

We do not like to do that if it can be avoided, as Preservation and Repair funds are always so much in demand.

Mr. SMITH. We do not want to give you anything that is not substantially emergent. Would not the same amount that we gave you last year cover the emergent items for next year?

Colonel ABBOT. Yes, sir. You gave us \$25,000 last year, and I think we can cover the emergent items with that amount. We will not be able to do all they would like to have us do, but we can get along. That would not, of course, cover Galveston.

Mr. GRAFF. As near as I can understand your testimony regarding the matter you think the items for Baltimore, Maryland, and at Fort Heath require immediate expenditures?

Colonel ABBOT. Yes, sir; in other words, more damage would result there from delay than elsewhere.

Mr. GRAFF. One is \$19,000 and the other is \$15,000?

Colonel ABBOT. Yes, sir; that would be \$35,000, but with \$25,000 we can possibly get along.

CONSTRUCTION OF SEA WALL, FORT SAN JACINTO, GALVESTON, TEXAS.

Mr. SMITH. The next item is, "For construction of a sea wall and fill for the protection of the military reservation at Fort San Jacinto, Galveston, Texas, \$925,000."

Colonel ABBOT. If there is going to be a garrison post erected there it will have to be protected. It is a long way from Fort Crockett. The connection is by a railroad which is on a government trestle which the worms will eat before very long. There is no good dirt road from one to the other. The last recommendation of the Chief of Artillery has been that the troops shall be stationed at Fort Crockett instead of at Fort San Jacinto, where he has always before wished them. That of course makes this item less urgent.

Mr. SMITH. Do you not think the object of getting an appropriation was to protect the quarters?

Colonel ABBOT. It was, very largely. Our batteries are safe. The appropriation was made for Fort Crockett without any effort on the part of the Engineer's Department, as I recollect.

Mr. GRAFF. Fort Crockett or Fort San Jacinto?

Colonel ABBOT. Fort Crockett, the one that has been appropriated for.

Mr. SMITH. If they are not going to establish any new quarters at Fort San Jacinto this is not emergent?

Colonel ABBOT. No, sir, not as a fortification matter; the batteries there are safe. The batteries are surrounded by ripraps that protect them. The rest of the reservation is now very full of water, however, and range finding and mine-defense stations would have to be expensively protected in the same way.

Mr. SMITH. You would not have to extend your range finders very far?

Colonel ABBOT. We build them where they are desired by the artillery authorities.

Mr. SMITH. And you could pay for that out of the fire-control appropriation?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. This is not strictly in the line of fortification work?

Colonel ABBOT. No, sir; the sea wall and fill is more the work of the Quartermaster's Department. We were asked to put it in, as sea-wall construction is more in our line than the Quartermaster's.

SEA WALL, FORT TRAVIS, GALVESTON, TEXAS.

Mr. SMITH. Is this Fort Travis matter in about the same situation?

Colonel ABBOT. Yes, sir; only Fort San Jacinto is in a worse shape, there is more water and less land at Fort San Jacinto than at Fort Travis as it now stands.

PRESERVATION AND REPAIR OF TORPEDO DEFENSE STRUCTURES IN UNITED STATES.

Mr. SMITH. The next item is, "For preservation and repair of structures erected for the torpedo defense of the United States, \$50,000." Have you anything further to say in regard to that item?

Colonel ABBOT. Nothing, except that we would like to secure the amount estimated. You gave us \$10,000 last year and we could continue with that amount, but the things are running down all the time.

Mr. SMITH. Are they not new?

Colonel ABBOT. Some of them are five or six years old. The first ones were built of wood. We are now building more permanent structures. When everything was uncertain as to type of building we put in wooden structures so as to develop the matter. Wooden structures do not last very long on the seacoast where everything is damp.

Mr. FITZGERALD. This estimate is mostly for paint?

Colonel ABBOT. Yes, sir; and for fixing the roofs. The roofs leak in many places.

Mr. FITZGERALD. What are the roofs, tin?

Colonel ABBOT. Some are of tin. A tin roof is tight but is so noisy that rain interferes with the communications by telephone. We have also tried tar and gravel roof, which is noiseless, but the sun cracks it and it does not last as long as the tin roof. One of the best roofs is like the deck of a steamer, made of boards with heavy painted canvas upon it. That lasts longer than tin and is not so noisy. It takes a great deal of money to keep up so many of these little buildings.

CONSTRUCTION OF MINING CASEMATES, CABLE GALLERIES, TORPEDO STOREHOUSES, ETC.

Mr. SMITH. The next item is, "For the construction of mining casemates, cable galleries, torpedo storehouses, cable tanks, and other structures necessary for the operation, preservation, and care of submarine mines and their accessories." Does this submarine-defense plan contemplate the use of it at many points other than those fortified?

Colonel ABBOT. No, sir.

Mr. SMITH. It does not extend beyond the fortified places?

Colonel ABBOT. Very few, if any. I am not quite certain but what there may be some projected for places where we have no forts at

the present time or where no forts are covered by the Taft Board Report.

Mr. SMITH. This \$464,964 which you estimate for would completely equip the service as fixed by the Taft Board?

Colonel ABBOT. Yes, sir, except at Chesapeake Bay and Fort San Jacinto, Galveston, Texas, according to our figures, which were the best that could be made at the time the Taft Report was authorized. So far we have been able to keep the submarine business pretty close to what the estimates were.

Mr. SMITH. What amount of this work on the Pacific coast is yet undone?

Colonel ABBOT. Practically the whole of it at San Diego is untouched; at San Francisco there is only a very little of it that has been attended to as yet; at the mouth of the Columbia River we have some of the old form of stations and casemates, but they are very inefficient, and at Puget Sound we have none except for the channel to Bremerton, where the navy-yard is. That is pretty well completed, as far as concerns Rich passage, the torpedo buildings there are pretty well completed, but some are needed at Agate passage and Deception Pass; they will be comparatively inexpensive.

Mr. SMITH. Can you tell us how much will be needed to complete the Pacific coast?

Colonel ABBOT. San Diego, California, \$86,314; San Francisco, California, \$102,000; Columbia River, \$30,400, and Puget Sound, \$13,800. On December 1st there was an available balance of \$178,694.62 and unallotted \$4,628.96, making a total of \$183,323.58 that had not been expended or allotted.

Mr. FITZGERALD. How much of this \$178,694.62 has been allotted to Pacific coast points?

Colonel ABBOT. \$30,781.89. We have been at work ever since December 1st, so considerable expenditures have been made from that balance.

Mr. GRAFF. The figures you have given us as to the points on the Pacific coast, totalling about \$231,000, presuppose the expenditure on the Pacific coast of these amounts that you have allotted, and for which you have balances on hand?

Colonel ABBOT. Yes, in addition to what we have already given.

Mr. SMITH. Do you understand that the allotment has been made more with reference to the places where the companies were located?

Colonel ABBOT. The Chief of Artillery told us where he was ready to have it put in. The Ordnance buys the material for him, and he knows where he is going to send his men, where they have got barracks for the men, and where he has storehouses, so that he can tell where to send the material that he is going to buy. He tells us and we build what he asks us to build and where he wants it.

Mr. SMITH. They have been putting five-sixths of it recently away from the Pacific coast.

Colonel ABBOT. On December 1st there was a \$31,649.62 balance unexpended for the Pacific coast out of the \$178,694.62 that was unexpended in all.

Mr. SMITH. What is the possibility of getting into San Diego without dredging out the bar?

Colonel ABBOT. I think there is 22 to 25 feet on that bar. No war vessel would get in there at the present time unless it was a small

light-draft vessel. The Navy is going to establish a coaling station there and are now beginning to build at the shore end of the Point Loma reservation. It is possible, if they get a large quantity of coal stacked up there, that some small-draft vessel might go in to set the coal pile on fire; but there is no need of more defenses at the present time I think.

Mr. GRAFF. Would it require \$231,000 to take care of the Pacific points that you have mentioned, or could some of this sum which was allotted on December 1st to the Atlantic coast be properly re-allotted to work on the Pacific coast?

Colonel ABBOT. No. You see that total corresponds with December 1st. We have had two months' expenditures out of it since. Probably a large quantity of that money is now in the shape of cement or railroad tracks, laid and ready to do work. When we allot to a location the district engineer officer makes all arrangements to do that piece of work complete; if we should withdraw his funds, it might very easily mean that we would lose the benefit of almost the whole amount he had spent. He might not have done anything towards the construction of the station. He might have laid the railroad tracks and bought cement only, so that it would be extremely expensive to now try to apply balances elsewhere. For instance, at Narragansett Bay there is the biggest balance of all, over \$45,000. That is very largely held up over a question of just where certain stations are to go. Pending the adjustment of these minor details the material is all bought and on hand, near the sites, but the money for payrolls has been held as it has not been needed till actual building began. In that country excavation is largely in rock, and that money will be available and needed to dig the holes when we know where the holes are to go. If we should take away that \$45,000 we would have to buy a similar amount of material on the Pacific coast, and the cement would spoil on the Atlantic coast, as it would not pay to try to transport it so far.

Mr. FITZGERALD. What is the necessity for these extensive fortifications on Narragansett Bay?

Colonel ABBOT. The Taft Board established that as one of the places where the work should be done. We have the guns in now and this is to complete the torpedo defences.

Mr. FITZGERALD. Do you know the reason why they need those defences up there?

Colonel ABBOT. They have a navy-yard.

Mr. FITZGERALD. Which navy-yard?

General MACKENZIE. A torpedo station.

Mr. FITZGERALD. This is part of the defence of Newport?

Colonel ABBOT. Yes. That is what Narragansett Bay means. There are two entrances, one by the city of Newport, and the other on the other side of Conanicut Island.

Mr. FITZGERALD. The only thing I had in mind was the pier.

Colonel ABBOT. The pier is on the outside of the defenses.

Mr. FITZGERALD. This is a defense of Newport?

Colonel ABBOT. Yes, of the Newport station.

EXPERIMENTAL. AUTOMOBILE TORPEDOES AND APPLIANCES AT FORT MONROE, VA.

Mr. SMITH. The next is for procurement and test of experimental automobile torpedoes and structures and appliances to operate them at Fort Monroe, Virginia, \$100,000. I wish you to state a little more fully to us what an automobile torpedo is, and how it is operated.

Colonel ABBOT. This sum was asked by the Chief of Artillery, and I am not sure exactly the type of torpedo he had in mind. Years ago we had some tests at Willetts Point of what we called automobile torpedoes in those days. It was a torpedo that ran by itself for a couple of miles and was steered from the shore by electricity.

It is a "submarine" that does not carry men in it. It runs itself, but does not carry a crew. It is not mixed up with the naval submarine question.

Mr. FITZGERALD. It has a submarine motor in it?

Colonel ABBOT. Yes. Some of them which are fired like the White-head torpedoes, contain their own power, but are not capable of being steered after they are once started.

Mr. SMITH. The Taft Board said they did not know anything about this, but recommend their adoption.

Mr. GRAFF. That is what they want the appropriation for—to find out.

Mr. SMITH. Do you know whether these automobile torpedoes are in use by any other nation?

Colonel ABBOT. We know that some of them were in use by the English.

Mr. SMITH. You say they have totally abandoned all torpedo defense?

Colonel ABBOT. That has been stated in the newspapers.

Mr. SMITH. Just after our scientists have told us that if we furnished this torpedo defense our harbors would be absolutely safe.

Colonel ABBOT. I myself would not recommend for an instant giving up torpedoes.

ROAD AT FORT HANCOCK, N. J.

General MACKENZIE. Then comes in this little item that the Chief of Staff desired us to present, an item of \$4600 for building a road in the rear of our batteries at Fort Hancock, which is deemed essential in connection with the protection of the heavy gun batteries from landing parties. It is not in the estimates, and the Secretary of War, while he did not submit a formal estimate, asked that the matter be presented by the Chief of Engineers to the Subcommittee in the hearing. It is a matter in connection with the land defense rather than the sea defense.

Colonel ABBOT. Entirely. It was a defense of the gun batteries against attack by landing parties.

Mr. SMITH. Where do you say this is situated?

Colonel ABBOT. At Fort Hancock, down at Sandy Hook. They want a road so that infantry supports can move about from one battery to another.

Mr. FITZGERALD. I am familiar with that down there. The batteries to the guns run down south, and from up where the station is and where the buildings are there is a road or drive, but it is quite

some distance down. Now the railroad that comes up from the Highlands comes up on the inside of the Hook, and I understood they wanted to run it down behind the embankment some distance so as to be able to move the troops.

Colonel ABBOT. To move our troops conveniently from one place to another in case an enemy should land along that beach. It is sandy walking there, and there is a good deal of underbrush, and it is a hard place to get around. In case of war a road could be built there with considerable dispatch, I think.

Mr. SMITH. That covers everything under the Engineers until you come to the insular possessions?

Colonel ABBOT. Yes, sir.

INSULAR POSSESSIONS—ENGINEER DEPARTMENT.

GUANTANAMO, CUBA.

Mr. SMITH. What has the Government now got at Guantanamo, Cuba?

Colonel ABBOT. From the funds appropriated in 1904 and 1905 batteries have been constructed. Two rapid-fire batteries have been built at Guantanamo, Cuba, for the defence of the naval station at that place.

Mr. SMITH. What has the Government got in the shape of a naval station there?

Colonel ABBOT. That we do not know. They have a target range, a partly built artesian well, and a considerable pile of coal.

Mr. SMITH. There has never been a dry dock authorized at Guantanamo?

Colonel ABBOT. No, sir.

Mr. SMITH. There is no naval station there of any character worth talking about, but there is a coal pile there?

Colonel ABBOT. I believe so.

General MACKENZIE. They have quite an elaborate dock.

Mr. SMITH. Is not the dock and coal pile all that there is there?

Colonel ABBOT. I have not been there. Our engineer officer who is there has been getting supplies from the naval station.

Mr. GRAFF. Are there any shops, or repair shops, or anything of that kind?

General MACKENZIE. I do not think they have very much of a plant yet. I know the Navy insists that that station is a very important one.

Mr. SMITH. It might be of importance eight or ten years from now, when the Panama Canal is opened, but not of much importance today.

HONOLULU AND PEARL HARBOR, HAWAII.

Now we come to Honolulu and Pearl Harbor. I will ask you to state whether what is known as the Pearl channel, formerly known as Pearl River, is navigable by battleships now?

General MACKENZIE. It is my firm conviction that in the opinion of the Navy it is not. It has a sufficiency of depth, but the channel is crooked. The sides are of coral rock.

Mr. SMITH. Are you able to tell us what amount of excavation is necessary to open Pearl channel in accordance with the plans of the Navy to a depth of 35 feet, and what amount would be required to open it to a depth of 30 feet?

General MACKENZIE. I have estimates for the cubic yards and for the units of price.

Mr. SMITH. You might read that and let it go into the record.

General MACKENZIE. The estimate which is furnished me by cable is that the Navy plan for a 35-foot channel would require the removal of 2,253,705 cubic yards at a cost of 60 cents per yard, and 1,245,130 cubic yards at a cost of \$1 per yard. For a 30-foot channel it would require the removal of 1,786,691 cubic yards at 60 cents, and 960,067 yards at \$1. Now, I have not anything showing what that Navy plan is, but I am expecting the papers.

Mr. SMITH. At one time you did do \$100,000 worth of dredging in Pearl channel?

General MACKENZIE. Yes, across the bar at the mouth.

Mr. SMITH. I wish when you get the proofs of your hearing you would fill in the exact width and depth of that channel as shown by the records in your office. (200 feet wide and fully 30 feet, generally 31 feet, deep at low water entirely across the bar from deep water in the ocean to deep water in the harbor.—An. Report Chief of Engineers U. S. Army, for 1905 p. 710.)

General MACKENZIE. Yes.

Mr. SMITH. General, you are in charge of most of the river and harbor improvements except such as are done by the Navy, are you not?

General MACKENZIE. Yes. I presume this would be a naval matter. That is, it would probably be considered a naval appropriation.

Mr. SMITH. Is it your judgment that the work as estimated at a dollar is in the coral?

General MACKENZIE. I think it is all coral. Some of it is very much harder. They have been making borings there. Some parts of it are very much harder than others.

Mr. SMITH. I was advised by Admiral Pulsifer that the borings showed that it was coral underlaid with mud. Do you know whether the borings so show or not?

General MACKENZIE. That I do not know. We have never had any detailed account. These borings have been made by the people of Honolulu.

Mr. FITZGERALD. Has Captain Otwell, of your corps, made any borings?

General MACKENZIE. No. We simply authorized him to give them advice in the matter.

Mr. FITZGERALD. He appeared to be very familiar with it.

General MACKENZIE. There is a report coming from him, I suppose, in the matter; but we simply called for this estimate by cable, so that I do not know the widths.

Mr. SMITH. If it should turn out that this was coral underlaid with mud, then do you interpret this telegram as meaning that the dollar a yard was coral, and that the other is mud?

General MACKENZIE. Without knowing, my interpretation was that probably the dollar work was outside, and the 60-cent work inside.

Mr. SMITH. Very well. Now with no more information than you have, are you able to give us even a crude estimate as to how long it would take, after the appropriation was made, to open this channel, considering the facilities that exist now in the Hawaiian Islands?

General MACKENZIE. It is rather a difficult thing to say. I could not answer very definitely. The full amount for the 35-foot channel would be three and one-half million cubic yards, which, if it would come down to a necessity to do it within a year, would require that ten thousand yards be removed per day. There is no plant there now to do that work. There would have to be new plants built, or plants taken from San Francisco. But of course the work would be progressive. There is no doubt but that within a year's time or less time there would be enough work done to let boats in or out, but not to accomplish the excavation of the full channel.

Mr. SMITH. What would be the cost of constructing the mortar batteries in the vicinity of Pearl channel and omitting for the present the construction of the heavy gun batteries?

Mr. FITZGERALD. Before you pass upon that question, General, do you know what is the largest boat that has ever gone into Pearl harbor?

General MACKENZIE. No; but I understand that no large boats have ever gone in there. There is no commercial use of the harbor at present.

Mr. FITZGERALD. There is nothing there but a couple of summer residences. I was informed that the largest boat that they ever attempted to take in there was a boat of about 700 tons.

Mr. GRAFF. There is a coral reef right at the mouth. That is the chief obstacle.

General MACKENZIE. That has been cut through. There is a 30-foot channel through that now.

Mr. FITZGERALD. But it is so narrow and tortuous that even if you had the proper depth there you could not turn a battle ship around in it.

General MACKENZIE. The channel through the outside reef is not so tortuous. That is practically straight.

Mr. FITZGERALD. Not straight enough for a boat to turn around in.

Mr. GRAFF. I was speaking of the coral reef outside.

General MACKENZIE. There may possibly have been a little work done in here [indicating on chart].

Mr. GRAFF. What is the proper width in a case of that kind for the use of battle ships?

Mr. FITZGERALD. That is 700 feet wide.

General MACKENZIE. They are calling for 400 feet, or something of that kind, with a wider channel in which to turn.

Mr. SMITH. I think that is what they told us the other day; 400 feet, with 1,000 feet for turning.

General MACKENZIE. I went in there with a little naval tug.

Mr. SMITH. Did you get the answer to that question about the mortar batteries, Colonel Abbot?

Colonel ABBOT. It would be somewhere in the vicinity of two hundred thousand dollars, but it is dangerous to give an estimate off-hand of what a modern battery would cost. The site is low, and the foundations may be troublesome. The two gun emplacements now allotted for will cost somewhat in excess of two hundred thousand

dollars. Last year's appropriation will build the eight mortars in the rear of Diamond Head and the two 12-inch emplacements at the mouth of Pearl harbor, nearly, but not quite sufficient to finish that battery.

Mr. SMITH. What is this \$1,110,000 for? Give us the items of it.

Colonel ABBOT. It is for two 14-inch guns at the mouth of Honolulu harbor to the westward of the channel.

Mr. SMITH. It is just eastward, is it not?

Colonel ABBOT. No; westward.

Mr. SMITH. That is right.

Mr. FITZGERALD. That is where they build a sort of island.

Colonel ABBOT. Yes. There will be some sand filling, but the foundation will be down on solid coral. It is not a deep fill. There is shallow water there [indicating on chart]. But it will make the emplacements cost somewhat more than in other places.

Mr. FITZGERALD. Where is the quarantine station?

Colonel ABBOT. There [indicating].

Mr. FITZGERALD. All of this place here is almost flush with the water. This [indicating] is out in the surf. They have got to build up an island there, first riprap it and put cribwork around it, and then fill it. Part of this million dollars is for that?

Colonel ABBOT. Part of it is for that.

Mr. FITZGERALD. How much of it is for that? Two 14-inch guns?

Colonel ABBOT. Yes.

Mr. FITZGERALD. Do you remember how much you paid for that property down there?

General MACKENZIE. I do not remember. It was considerable.

Mr. FITZGERALD. Thirty-five thousand or forty-five thousand dollars, or something like that?

General MACKENZIE. I think so. There is no doubt that before we get through there will be some heavy guns put in there.

Mr. FITZGERALD. I understand that the original plan contemplated some guns here [indicating], and also some guns at Ahua Point, and some at Queen Emma's Point. Col. Story made that trip around the world, and as the result of his report this Ahua Point scheme is abandoned. They proposed to put in guns there, and that is to be turned over to the Army for the purpose of erecting barracks at a cost of \$113,000 for a hundred and odd acres, the old Ah Fung property. That comes to about \$25,000. It is reported that those guns have been cut out.

General MACKENZIE. One of these points [indicating] is the new Army station. From here you look right down on the Sam Damon place.

Mr. FITZGERALD. How far is that from here?

General MACKENZIE. About three miles.

Colonel ABBOT. That chart is a little over an inch to the mile.

Mr. FITZGERALD. That is three or four miles to deep water.

Colonel ABBOT. That is the trouble. The mortars could not reach out further than here [indicating]. These mortars, here, reach over to here, but relative location is such that it gives a very deep section that an enemy would have to come through under the fire of all 16 mortars.

Mr. FITZGERALD. Have those mortars a range of 6 miles?

Colonel ABBOT. Yes. They reach 6 miles from over there. The mortar battery reaches over that point [indicating] about a mile.

Mr. SMITH. The object is to overlap the other mortar battery field of fire?

Mr. GILLETT. Have you begun fortifying Honolulu?

Colonel ABBOT. Yes. We are fortifying here [indicating]. We have bought lands and have begun here [indicating].

Mr. GILLETT. You have not begun at Pearl harbor?

Colonel ABBOT. No, sir.

Mr. GILLETT. I suppose that Honolulu is good for nothing as a base for a foreign fleet. There is no harbor there?

Mr. FITZGERALD. Yes, but it is not very large. It can not accommodate many vessels.

General MACKENZIE. It is small.

Mr. GILLETT. I wondered whether we were spending all that money simply to protect the city, or whether there is a harbor there that foreign ships can use.

General MACKENZIE. They could use the wharves.

Mr. GILLETT. Can the warships get up against the wharves?

General MACKENZIE. Yes.

Mr. SMITH. You said that out of the existing appropriations heretofore made you had got everything allotted for the necessary fortifications?

Colonel ABBOT. No, sir. I said that this battery is going ahead. We ought to be able to mount the mortars in a short time. Over here [indicating] we have been delayed in the purchase of the site. The plans are approved for the 12-inch guns to go there.

Mr. SMITH. To what extent has the money been appropriated for the emplacements here [indicating]?

Colonel ABBOT. We have allotted it, but it has not been expended.

Mr. SMITH. We do not need to appropriate the money?

Colonel ABBOT. No. But there are eight mortars to go there before that harbor defense, according to the Taft Board, is completed.

Mr. SMITH. Can you tell us where you expect to spend this \$1,110,000, and what the items of it are?

Colonel ABBOT. I have the items approximately here. Two 14-inch guns in that site will cost about five hundred thousand dollars.

Mr. SMITH. That is for the emplacements?

Colonel ABBOT. Yes. The mortars will cost, over at Pearl harbor, about two hundred thousand dollars.

Mr. FITZGERALD. For the emplacements?

Colonel ABBOT. Yes, sir. For the three-inch guns the emplacements will cost about twenty-five thousand dollars.

Mr. FITZGERALD. Where are they to go?

Colonel ABBOT. Over at Pearl harbor.

Mr. FITZGERALD. You do not want to put them there [indicating]? Nothing can go in there at all now but a tug boat.

Mr. SMITH. We are trying to ascertain what we do not need to appropriate for now. Are these 3-inch guns needed now?

Colonel ABBOT. No, not more than the 8 12-inch mortars.

Mr. SMITH. What can we leave out?

Colonel ABBOT. The mortars and 3-inch guns over here are what you can leave out; costing \$200,000 and \$25,000.

General MACKENZIE. Those are 3-inch guns.

Mr. SMITH. You said about \$200,000?

Colonel ABBOT. The mortars are about \$200,000.

Mr. SMITH. We will leave them out for the present. Now, these 14-inch guns here you regard as of immediate importance?

Colonel ABBOT. Yes, sir.

Mr. SMITH. What is the amount required for them?

Colonel ABBOT. About \$500,000 for the batteries, and we will have to have the land there, costing perhaps \$350,000.

Mr. SMITH. Those two 14-inch guns and emplacements will cost \$1,100,000 when you come to mount them, without the ammunition?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. Do you mean to say that that land will cost \$300,000?

Colonel ABBOT. That is my recollection. It is largely a question of what area the Artillery will need.

Mr. FITZGERALD. You must have some estimate of the size of it.

Colonel ABBOT. Yes, but I have not got it with me. I can give you the exact figures when I get up to my office.

Mr. SMITH. Fill them in when you come to examine your notes?

Colonel ABBOT. Yes.

The total items of the estimate are as follows:

At site west of Honolulu:

Fill.....	\$387, 200. 00
Two 14-inch emplacements.....	475, 000. 00
Two 3-inch emplacements.....	22, 800. 00

At Queen Emma Point (Pearl Harbor):

Emplacements for 8 mortars and two 3-inch guns.....	225, 000. 00
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Total.....	1, 110, 000. 00
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Mr. SMITH. Has all the money been provided for over at Diamond Head?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. They have taken for the emplacement of the mortars there some Government land at Diamond Head?

Colonel ABBOT. Yes.

Mr. FITZGERALD. Then they also bought 40 acres across the road.

Colonel ABBOT. That is Waialaei, right across from the mortar battery.

Mr. FITZGERALD. There is a road that comes around there and through there-[indicating]. I understand that side of the road is Government land. There it is.

Colonel ABBOT. That is the peak.

Mr. FITZGERALD. They took 40 acres in there, and then there was a question as to whether that was the most advisable place. Have you bought these 40 acres here?

Colonel ABBOT. Yes; that was already bought.

Mr. FITZGERALD. They were to mount some guns there of small caliber as a defense against landing along here. There is no more money required for sites here?

Colonel ABBOT. None for sites.

Mr. FITZGERALD. Has all the money for emplacements been appropriated?

Colonel ABBOT. Yes.

Mr. SMITH. I do not understand how this \$1,110,000 is made up. You said \$862,200 is for these 14-inch guns. You said you had all the money for Diamond Head?

Colonel ABBOT. Yes.

Mr. SMITH. And the money over here for everything except the mortars?

Colonel ABBOT. Yes, and the 3-inch emplacements and part of the 12-inch battery.

Mr. SMITH. So that your judgment is that the only thing now in contemplation here that is useless is about \$25,000 for the 3-inch guns over in Pearl channel?

Colonel ABBOT. These mortars in here do not add very much to this defense. We could stop the \$25,000 and the \$200,000 for these mortars, and we could move the twelves, for which we have the funds, but have not begun to build yet; we could move those over here [indicating] on this site in case Congress should decide they are not going to fortify Pearl harbor. We could apply the funds that we were going to put in there over into this defense [indicating]. The result would be different from the Taft Board scheme, however.

Mr. FITZGERALD. I understood that those mortars were practically of no use whatever as a defense to Honolulu.

Colonel ABBOT. Theoretically they cover the entrance at long range.

Mr. FITZGERALD. But the fact is that Honolulu itself is at the extreme limit of distance from the site for those mortars at which they would have any effect?

Colonel ABBOT. Yes.

Mr. FITZGERALD. And while it was intended that these two mortar batteries should overlap with those mortars where they are located there, they will not fire far enough to the seaward?

Colonel ABBOT. They overlap at the right place. The distance from the shore at which a ship could lie would be quite well out.

Mr. FITZGERALD. As I understand it, if a ship would lie out here [indicating], these guns would cover it?

Colonel ABBOT. If we had them in, they would. We have not got them in.

Mr. FITZGERALD. I was anticipating that they might be authorized. Here is where ships are likely to lie [indicating], and not here [indicating]. The guns that would be mounted there at Queen Emma's Point are primarily for the protection of Pearl harbor and are practically of no value as a defense to Honolulu?

Colonel ABBOT. That is practically true.

Mr. SMITH. Do you think, if we gave you \$800,000 at this point here [indicating], that Honolulu would be safe as nearly as it can be reasonably made at present?

Colonel ABBOT. Yes; but I do not believe that it is a very heavy defense.

Mr. SMITH. That is because you think there ought to be more artillery mounted here and here [indicating]?

Colonel ABBOT. No.

Mr. FITZGERALD. Here is where the guns would be effective at Waikiki?

Colonel ABBOT. These guns [indicating] would be more effective than those [indicating], because they would take the ship head on,

and they are much more afraid of shots coming over the bow than those coming from the sides.

Mr. FITZGERALD. The impression I had was that this motar battery here [indicating] would be the effective thing, behind Diamond Head.

Colonel ABBOT. A fleet would be afraid of that and would keep some six miles out. They can not get in because the motar range covers the channel.

Mr. SMITH. If you left the 12-inch guns here, could you get along without the motars?

Colonel ABBOT. No. These 12-inch guns are at extreme range, if you put them in so that they will shoot down parallel to the coast, which is very easily done, it would bring some fire in to this point, but it is long-range fire for guns and long range for motars.

Mr. FITZGERALD. Those 12-inch guns there have no bearing on a ship coming into Honolulu. No vessel will come in here [indicating]. It will be out here, two or three miles out, and add 6 miles to that. Those guns there [indicating] are absolutely useless?

Colonel ABBOT. They can not knock this battery out [indicating].

Mr. FITZGERALD. These [indicating] and those [indicating] are the ones that they insisted were the effective defenses.

Colonel ABBOT. I would like to say that two guns here [indicating] and two mounted there [indicating] for the defense of Honolulu are important.

Mr. FITZGERALD. They said that battery there would be important, except that one of the reasons why they eliminated it was that it was so low and practically flush with the water that it was not as effective as it would have been if placed on some elevation. Will you tell me why the Army is going to pay \$50,000 for Waipio Point there?

General MACKENZIE. No; they are not going to.

Mr. FITZGERALD. If they are not, it is because of a tie up there that is going to prevent the spending of the money. It was a place at which under the Naval scheme guns were to be placed?

General MACKENZIE. Yes.

Mr. FITZGERALD. You have a site here at Ahua Point and one at Queen Emma's Point, and at Bishop's Point; and it is simply because that thing had been in the Navy scheme and the thing was under way, and no one over there knew what in the world to do with it except to buy it, and it is practically a swamp.

Colonel ABBOT. There has been no proposition in our office to buy that point. It is a very good point for small guns, because it sweeps the whole length of the channel.

Mr. FITZGERALD. If an enemy got in there, those guns would be no better than popguns?

Colonel ABBOT. No. It has not been in any of our projects since the original project.

General MACKENZIE. This is marked "Navy." I suppose it is to indicate a Navy scheme.

Mr. FITZGERALD. As I understand, when this place was selected it was a naval scheme, and the two places at which they intended to mount their guns to defend the naval station was Waipio Point and Bishop's Point. Afterwards it was made more comprehensive and came under the Army, and the Army said "We ought to have one battery here [indicating] and one here" [indicating]. Now it is recommended that no guns be erected on this side. That is to be utilized

for barracks for the garrison, and the schemes for guns at these two places have been abandoned, and yet the negotiations were under way to buy that.

General MACKENZIE. That must have been for the Navy.

Mr. FITZGERALD. No. Captain Otwell is not in the Navy.

Mr. GILLETT. That channel is a very long and narrow one, is it not, as you approach?

General MACKENZIE. Yes.

Mr. GILLETT. How far out does it run—the narrow channel?

Colonel ABBOT. It is about 3 miles.

Mr. SMITH. That is this one, known as Pearl Channel; it would have to be opened up.

Mr. GILLETT. I meant at Honolulu?

Mr. SMITH. They are now at Pearl Harbor entrance.

Mr. GILLETT. I meant the Honolulu Channel.

Colonel ABBOT. That is very close in.

Mr. GRAFF. I want to ask whether or not there had been any plans or intention of fortifying the harbor of Hilo on the Island of Hawaii.

Colonel ABBOT. There is no such provision in the Taft Board report.

Mr. FITZGERALD. Would you mind giving the exact figures as to the cost of this site for the 14-inch guns? If I have it right here, it altogether amounts to \$800,000.

Colonel ABBOT. I will give the exact figures when I get them. (Site, \$387,200; emplacements, \$475,000; total, \$862,200.)

MANILA, PHILIPPINE ISLANDS.

Mr. SMITH. Manila, Philippine Islands, \$6,480,000. Have you any maps here showing what the projects are in the Philippines?

Colonel ABBOT. No, I have not, but I can describe the situation there.

Mr. FITZGERALD. Before you do that, were those estimates submitted before or after it was decided to practically abandon Subig Bay?

Colonel ABBOT. The estimates that were submitted in the book of estimates were of course prepared long before any such change was made. But the figures which we are submitting now are exactly the same in amount, because the investigation that I made over there in the Philippines showed me that while certain guns which were intended for Subig Bay could be eliminated at that point, the cost of putting them in Manila Bay would be greater than originally estimated; so that while the number of guns in the two bays is somewhat decreased we did not dare to decrease the total estimated cost.

Mr. FITZGERALD. The reason I ask is to understand whether there would be given much attention to Subig Bay.

Colonel ABBOT. Subig Bay will need no more money appropriated.

Mr. GILLETT. Is it officially abandoned?

Colonel ABBOT. No, sir; but we have money enough, and the batteries are far enough advanced, so that we have money enough to finish them.

Mr. GILLETT. The newspapers have been saying that the plan was to give up Subig Bay.

General MACKENZIE. I think we could almost say that it is official.

Mr. SMITH. I have been told that the Navy Department still insisted it was necessary to fortify Subig Bay to prevent the harbor being used by an enemy.

Colonel ABBOT. That is just what I have heard unofficially.

Mr. SMITH. Now, please explain, in a general way, what is contemplated under this estimate for the Philippine Islands.

Colonel ABBOT. The whole estimate is for Manila.

Mr. SMITH. All for Manila?

Colonel ABBOT. Yes, sir.

Mr. SMITH. I wish you would file in your statement at this point, the entire amount which you have received in your branch of the service for Manila under appropriations heretofore made, including those made specifically for the Philippine Islands and those made for the insular possessions and the Philippine Islands.

Colonel ABBOT. Yes

The amounts applied to defenses of Manila from all appropriations made to date are approximately as follows:

For battery construction.....	\$1,267,700.00
For fire control.....	35,000.00
For torpedo defense structures.....	230,000.00

Total.....	1,532,700.00
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Mr. SMITH. You are aware that you have received a large amount for Manila already.

Colonel ABBOT. Certainly.

Mr. SMITH. Considerably more than a million dollars.

Colonel ABBOT. The total amount appropriated, gun and mortar batteries in the insular possessions, has been \$2,360,000 for the Hawaiian Islands and the Philippine Islands combined, and Guantanamo.

Mr. SMITH. That leaves more than a million dollars, which is all the Manila money you have already received.

Colonel ABBOT. Yes, sir.

Mr. SMITH. Has your branch of the work in any one site in the continental United States cost over \$7,000,000? That is, for the batteries alone?

Colonel ABBOT. I should say not, and I do not think it has for batteries alone, at any rate.

Mr. SMITH. Is Manila a more difficult place to fortify than any place in the continental United States?

Colonel ABBOT. Yes, sir.

Mr. SMITH. For what reason?

Colonel ABBOT. Materials are more expensive, and the entrance is very wide. There are two channels, and the batteries will have to be built at a height of nearly 600 feet above the water surface. The sides of the islands are generally precipitous for a couple of hundred feet, and the materials will have to be brought from immense distances. The labor is hard to control, especially white labor, for supervision; and the native labor is not anything like the labor we can get in this country per man.

Mr. SMITH. It is very much cheaper per man, is it not?

Colonel ABBOT. Yes, but not cheaper per cubic yard of concrete.

Mr. SMITH. What guns have you already provided for the defense of Manila?

Colonel ABBOT. We have emplacements absolutely completed for four mortars; absolutely completed for two twelve-inch guns, and I presume at this time absolutely completed for two additional 12-inch guns, and a battery, which must now be pretty well advanced, for two more 12-inch guns.

Mr. SMITH. Where are they situated?

Colonel ABBOT. On Corregidor Island.

Mr. SMITH. There are no fortifications whatever excepting those?

Colonel ABBOT. A mortar battery for eight mortars in addition to the four, and which must be well started by this time. It was started in fact when I was there in November. A battery for three 6-inch guns should be well along at this time also. Also a battery for one 10-inch, another one for two 6-inch guns are just about beginning, and a battery for four 15-pounders is probably just about beginning, with funds already appropriated.

Mr. SMITH. What do you say as to the relative importance of these fortifications as compared with those on the shore?

Colonel ABBOT. I do not believe that there should be any on the shore.

Mr. SMITH. I did not mean immediately on the shore, but I mean on the mainland?

Colonel ABBOT. On the Island of Luzon?

Mr. SMITH. Yes.

Colonel ABBOT. I do not think anything ought to go on the main Island of Luzon.

Mr. SMITH. What other fortifications are there, in a general way, besides these on Corregidor Island?

Colonel ABBOT. They are proposing to put in four 14-inch guns on Caballo Island, which is about a mile from Corregidor.

Mr. GILLET. In what direction?

Colonel ABBOT. Toward the wide channel side, and a little to the front. Then on Carabao Island, which is near the other side of the broad channel, there are two 14-inch guns and eight mortars proposed at the present time. Then there are a number of guns that are intended to go on El Fraile Island extended.

Mr. GILLET. What do you mean by "extended?"

Colonel ABBOT. El Fraile is too small now, and will have to be increased in size. It is an artificial island in a limited sense.

Mr. FITZGERALD. How many acres are in the island now?

Colonel ABBOT. It is very small, and we can not make a very close estimate as to how much it will cost to extend it now.

Mr. FITZGERALD. How large is it now?

Colonel ABBOT. It is about 180 feet long and perhaps 75 feet broad.

Mr. FITZGERALD. Not half an acre.

Colonel ABBOT. No. It extends into immensely deep water. The question is under investigation now as to what it would cost to build an artificial island further up the bay a little way, where the depth is not so great as around El Friele, and to see which is the least expensive.

Mr. FITZGERALD. Are those absolutely essential to the defense?

Colonel ABBOT. To make the place impregnable, yes, sir. That is where the big estimate comes in.

Mr. FITZGERALD. Is it as important or less important than the island at the mouth of Chesapeake Bay?

Colonel ABBOT. As important.

Mr. SMITH. Which would be the next in importance that you would undertake?

Colonel ABBOT. If you give us the whole sum we ask for?

Mr. SMITH. If we give you a small piece of what you ask for, which would be the one that you would undertake?

Colonel ABBOT. Carabao Island.

Mr. SMITH. How much would it cost to construct batteries on that island?

Colonel ABBOT. I can not give you the figures, but I have them in the office. (Later: \$954,000; being \$510,000 for two 14"; \$300,000 for 8 mortars; \$144,000 for wharf track and plant.)

Mr. SMITH. You may fill them in at this point.

Colonel ABBOT. It would be approximately for two 14-inch guns—at least \$500,000 on that island.

Mr. SMITH. Let us get an idea of the order of these various fortifications. Suppose now that we can use in the neighborhood of \$500,000 for that, and contemplate completing still one more set of batteries. What would be the next in importance?

Colonel ABBOT. The next in importance would be to start in on that artificial island.

Mr. SMITH. As I understand you, you have not decided whether you are going to build an artificial island, or try to extend one that is there now?

Colonel ABBOT. No, because we have to find out the least costly, and we have not yet had time to do that. It is so hard to get white men who are capable of making soundings and maps.

Mr. SMITH. In view of the fact that we have never given you over \$600,000, and that you have found it impossible to make surveys outside of Corregidor Island, would you not say that it is almost ridiculous to give you \$6,000,000 to spend on this item before the 4th of next March?

Colonel ABBOT. Yes, we can not spend it, but what we would like, if we could get it, would be to make a start on the construction of the unavoidable island.

Mr. SMITH. You could not do that for a month, could you?

Colonel ABBOT. We can make contracts for material. It will require dredging, and we can start quarries and all that sort of thing.

Mr. SMITH. But you will have to make borings to see whether it is cheaper to extend this island or not.

Colonel ABBOT. We can not make borings. The water is from 90 to 130 feet deep. It means to do what the Japanese have done in Tokyo Harbor, and that is to build up a retaining ring of riprap, and to pump sand to the inside.

Mr. SMITH. Is sand available?

Colonel ABBOT. We find it around Carabao Island and around Corregidor.

Mr. SMITH. Is it practicable to pump it from that depth?

Colonel ABBOT. No, but we can pump it from a less depth than that, and then dump it within the riprap ring or pump it in by a second handling.

Mr. SMITH. You have not the slightest estimate to give us of the cost at either place?

Colonel ABBOT. The best estimate we can make from investigation and reasoning without any concrete data.

Mr. FITZGERALD. How much of this \$6,000,000 have you figured out is necessary to use for that island in the 60, 90, or 150 feet of water, whatever it is?

Colonel ABBOT. \$3,500,000 is the estimated cost for filling for wharves and so forth at El Fraile.

Mr. FITZGERALD. Could you not erect batteries on the mainland, and also put up guns for defense against attack that would be just as effective and a good deal cheaper than this?

Colonel ABBOT. No, sir.

Mr. FITZGERALD. Have we ever, in this country, filled an artificial island from 90 feet of water, upon which to erect emplacements for heavy guns?

Colonel ABBOT. We never have.

Mr. FITZGERALD. Have they at any place in the world?

Colonel ABBOT. There are tolerable depths at some of the islands in Tokyo Harbor. It is very deep water there, but I do not remember the depth now.

Mr. FITZGERALD. And this estimate of \$3,500,000 is based on what?

Colonel ABBOT. The best guess that we can make.

Mr. FITZGERALD. It might be \$10,000,000?

Colonel ABBOT. I doubt if it would be. I think we are on the safe side; it is the best approximation that we can make without sufficient data.

Mr. FITZGERALD. It might be cheaper to build two 20,000-ton battle ships and anchor them there.

Colonel ABBOT. It might be.

Mr. SMITH. Has anybody ever tried to retain sea walls around 90-foot water of this kind?

Colonel ABBOT. There has been no trouble that we have any evidence of, with those islands in Tokyo Harbor where they are exposed to equal currents and equal seas to what they are in Manila Bay—

Mr. SMITH. Have you had any occasion on the mainland to attempt to build sea walls in great depths, backed with sand?

Colonel ABBOT. Not frequently; no.

Mr. SMITH. What is the greatest depth of sea wall anywhere being constructed?

Colonel ABBOT. We have not got any fortification sea walls at any considerable depths at all. We put them generally at the high-water mark.

Mr. SMITH. So that as a matter of fact you do not know much about the actual experience of trying to maintain sea walls of great height, even on existing land, backed by sand?

Colonel ABBOT. No.

Mr. SMITH. Would you not think, as an engineering problem, that that is a hard one?

Colonel ABBOT. They do not seem to have had any trouble in Tokyo Harbor.

Mr. FITZGERALD. How deep was the water there?

Colonel ABBOT. My impression is that it is about 100 feet.

Mr. SMITH. What is the fact as to there being numerous landing places on the Island of Luzon?

Colonel ABBOT. They are very numerous.

Mr. SMITH. Without a loyal population in the Philippines, what utility would these fortifications be, any of these at Manila?

Colonel ABBOT. Manila is so situated on Manila Bay that it can be held against the rest of the Island by a line of intrenchments not requiring a very large force to hold them.

Mr. GILLET. What do you mean by a very large force?

Colonel ABBOT. With fifteen or sixteen thousand men we ought to be able to hold Manila against a large force. If we can then hold the bay against a naval attack, we give a base of supplies for our navy, and hold the archipelago, because whoever holds Manila has the Philippine Islands practically. If we can not keep a hostile navy out of Manila Bay, and it comes in and attacks from the sea side, while our troops are attacked by land, we can not hold the city.

Mr. SMITH. When you say 15,000 men with intrenchments could hold the city from the land side, against how much force of modern soldiers could they hold it?

Colonel ABBOT. I have not the exact figures, but it was estimated that it would be possible with that total number of troops to hold for a considerable time the city of Manila against probable attack that would be made from the land side.

Mr. FITZGERALD. You say \$3,500,000 of this \$6,000,000 is for that island?

Colonel ABBOT. Yes, sir.

INSTALLATION OF ELECTRIC PLANTS.

HONOLULU AND PEARL HARBOR.

Mr. SMITH. We now come to the installation of electric plants at the defenses of various localities. For Honolulu and Pearl Harbor, Hawaii, you ask for \$34,469.

Colonel ABBOT. The batteries are so scattered out there that we figured on putting in little plants into the batteries themselves.

Mr. SMITH. What batteries does this contemplate?

Colonel ABBOT. Those that we have in our estimates.

Mr. FITZGERALD. How much of this is necessary to those 14-inch guns?

Colonel ABBOT. I can not tell you exactly, but I should suppose about \$10,000.

Mr. FITZGERALD. Did the Department ever figure on utilizing the current from private plants in places like this, or anywhere else, instead of installing separate plants?

Colonel ABBOT. Yes, we have done it in a number of places where it could be done.

Mr. FITZGERALD. Take Honolulu, for instance. They have an electric lighting and a street railway plant there. Could you not very easily and economically get all the power you wanted there without having it separate?

Colonel ABBOT. In that case it would involve putting out to the 14-inch batteries a cable across the channel, which is apt to be troublesome, and out to the mortar batteries would be a very long line, and one liable to be broken at any point.

Mr. FITZGERALD. But at Waikiki?

Colonel ABBOT. There would be no trouble there at all.

Mr. FITZGERALD. And that is about half a mile from the electric road?

Colonel ABBOT. Yes, sir, much less.

Mr. FITZGERALD. Have you done that at other places?

Colonel ABBOT. Yes, at Fort Taylor, Key West, and at Fort Rodman, and at Sullivans Island in Charleston Harbor, and at several other places.

Mr. FITZGERALD. How much of this, I would like to know, would be required for those guns and mortars at the entrance of Pearl Harbor?

Colonel ABBOT. It would probably be about half the cost of the installation, or very nearly that.

MANILA, P. I.

Mr. SMITH. Now as as to Manila, Philippine Islands. Is this for the fortifications at Corregidor?

Colonel ABBOT. For all of them.

Mr. SMITH. Have you got in this item an estimate to cover the artificial island there?

Colonel ABBOT. Yes, that is in there. If we put in the artificial island we must have the electric power.

Mr. SMITH. How much of this will you need before next spring, if any?

Colonel ABBOT. We could use right now on Corregidor Island at least \$100,000 to advantage.

Mr. SMITH. Have you got any electric light plant there?

Colonel ABBOT. No, sir.

Mr. SMITH. What do you use this electricity for, ordinary lighting and searchlights?

Colonel ABBOT. Ordinary lighting, searchlights, and ammunition service.

Mr. FITZGERALD. Is that for guns practically ready to mount and now mounted?

Colonel ABBOT. The 12-inch guns and the carriages are over there, and the 10-inch guns were coming ashore when I left. The 6-inch carriages were in Manila Bay, and one of them ashore.

Mr. SMITH. Something like four years ago we commenced to give guns from the continental United States to the Philippines. Are these guns actually mounted now?

Colonel ABBOT. No, sir, but they are the ones that were undoubtedly received, just as I left.

Mr. SMITH. Then no guns have been shipped over there recently and accepted.

Colonel ABBOT. One cargo was brought in.

Mr. SMITH. The representative of the Commercial Club of Honolulu was complaining about seeing these guns shipped to Manila. As a matter of fact, they are guns that were provided for many years ago?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. You had no place to mount them?

Colonel ABBOT. Yes, sir, the emplacements were ready for a number when they arrived.

Mr. SMITH. Without attempting to intimate, because I do not know what the Committee may see fit to do, but if they gave you \$500,000 for seacoast batteries in the Philippines, \$100,000 would be the outside limit that you would have use for under this item?

Colonel ABBOT. Yes, sir, but we could use more than that \$100,000 at Corregidor. We haven't funds enough now in our hands, and we are making arrangements for a wharf at Carabao Island for the 14-inch guns. As soon as this appropriation becomes available we ought to be able to start in toward the construction of the 14-inch emplacements there. If we begin with the electric plant, and have it in hand to start with, we can save money in the construction of the battery; building with that power instead of putting in hoisting engines all over the place to work the derricks. It is much easier and cheaper to work a derrick by a motor.

Mr. SMITH. How much would that cost?

Colonel ABBOT. That would cost about \$15,000, though possibly about \$10,000 would do it. That leaves Subig Bay without any electricity, but I suppose that is safe.

Mr. SMITH. Does it need any?

Colonel ABBOT. We have two 10-inch emplacements there with electric hoists, but they could be served by hand.

Mr. SMITH. What would the electric plant for what you now plan for Subig Bay cost?

Colonel ABBOT. If we get \$5,000 for one 25-kilowatt set, we could put that in the 10-inch battery, and that would operate the hoisting apparatus.

FIRE-CONTROL STATIONS AND ACCESSORIES.

Mr. SMITH. Now the next item is the general item in which you are only partially beneficiaries, the construction of fire-control stations and accessories and so forth. For that you ask \$1,305,739. That includes \$280,000 for Guantanamo?

Colonel ABBOT. We are very little interested in this item because with the funds already given us we have gotten in most of our work. On Corregidor Island the stations are pretty nearly built. We will have to put in some Signal Corps ducts, but we can not do that until we know what the routes will be.

Mr. GRAFF. How about Pearl Harbor, Honolulu?

Colonel ABBOT. There has nothing been done at Pearl Harbor, Honolulu, in the way of fire control, but it should be put in.

Mr. SMITH. Have you a fire control for those batteries there?

Colonel ABBOT. The mortar battery behind Diamond Head will require fire control almost immediately.

Mr. SMITH. Under your modern system of fire control, is it a single entity for all of these fortifications at Honolulu and Pearl Harbor?

Colonel ABBOT. No, there would be a system for the Honolulu defenses, and another one for the Pearl Harbor defenses. They are too far separated to be controlled by one fire control.

Mr. SMITH. Do you say that there is any such amount as this necessary between now and next March?

Colonel ABBOT. Not the whole amount. You see I am only speaking for the Engineers' side, not knowing what the other people would want.

Mr. SMITH. Their work is done after yours?

Colonel ABBOT. Generally speaking after ours, but while we were over there at Honolulu, Captain Embick, from the Chief of the Artillery's Office, and myself, went over the matter with extreme care

and laid out the whole fire-control plans for the defenses at present proposed for Honolulu and Pearl Harbor.

Mr. SMITH. How much of this will be necessary, in your judgment, before next March?

Colonel ABBOT. We would like to get about \$50,000, and we could spend that to advantage on places we have already locations for, and it would be useful in connection with the mortars.

Mr. FITZGERALD. You have to build the islands first.

Colonel ABBOT. I said in connection with mortars.

Mr. FITZGERALD. At Diamond Head?

Colonel ABBOT. At Diamond Head; one reason is mortars are absolutely useless without a position-finding system.

Mr. FITZGERALD. When I was there last May they had no emplacements for mortars at Diamond Head.

Colonel ABBOT. But I was there last October, at that time they began to put in the foundations for the mortars.

Mr. FITZGERALD. And they will be completed quickly, you think?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. And \$50,000 could be utilized.

Colonel ABBOT. Yes, in connection with the fire control. While we are working at this particular case we are almost compelled to put in the complete system if we are going to exercise any economy. \$50,000 is not an over estimate of what it will cost.

Mr. SMITH. The work of the other branches would be probably more advanced than your own work by the 4th of March a year from now.

Colonel ABBOT. Well, they know just what they want, and they purchase material by contract very rapidly if the funds are allotted to them.

Mr. SMITH. So that your judgment is that \$50,000 for your part, and the amount as shown by the hearings for the other branches, ought to be allowed for Honolulu?

Colonel ABBOT. I think it is desirable. Of course we can get along with less. They could make a temporary station up there and do some kind of shooting, but in order to take full advantage of the ordnance material actually mounted we ought to have considerably more than that now.

Mr. SMITH. How much will be required for your branch for the fortifications at Subig Bay?

Colonel ABBOT. In the fire control we have funds enough in Captain Howell's hands now to cover it.

Mr. SMITH. Do you understand that that is true as to the other branches?

Colonel ABBOT. No, I do not think so.

Mr. SMITH. But nothing will be needed for the Engineer Corps for Subig Bay?

Colonel ABBOT. No, sir.

Mr. SMITH. What do you say about Manila? There certainly will be nothing ready excepting at Corregidor Island?

Colonel ABBOT. Excepting at Corregidor Island.

Mr. SMITH. What would you say would be your share for that?

Colonel ABBOT. It is only a question of laying down the ducts on Corregidor, because the stations are all built now.

Mr. SMITH. Can you give us an idea of what is needed by the Engineer Corps for that?

Colonel ABBOT. It depends on when we get the Signal Corps information. Do you mean before next March?

Mr. SMITH. Yes.

Colonel ABBOT. I do not believe we would be able to spend much of anything, unless we get the plans. As soon as we get the plans we can go ahead. There is quite extensive duct laying to be done there.

Mr. GRAFF. Is this for the Ordnance and the Engineer Corps both?

Colonel ABBOT. It includes everything, and the Signal Corps besides.

FORTIFICATION OF PORTO RICO.

Mr. SMITH. Why is it that there has practically never been any money even asked for the fortification of Porto Rico?

General MACKENZIE. The matter has not yet been considered in detail.

Mr. SMITH. Was Porto Rico fairly well fortified by the Spanish when we took it?

General MACKENZIE. I think they were nearly all old guns.

Colonel ABBOT. They had some modern guns in the old fortifications, not of the latest type, but some Hontoria guns were pretty fair.

Mr. SMITH. Does not Porto Rico, in some degree at least, bear the same relation to the Atlantic coast that the Hawaiian Islands do to the protection of the Pacific coast?

General MACKENZIE. In those matters, I might say that I think consideration has been given to the naval opinion to a large extent and at the time before the Taft Board met Guantanamo was the point which was considered of most exceeding importance in Cuba.

Mr. SMITH. Did the Taft Board recommend nothing whatever for Porto Rico?

Colonel ABBOT. They recommended \$973,038 at San Juan, but that was not considered in their minds as important as Guantanamo.

Mr. SMITH. But no estimates have ever been made under the recommendation of the Taft Board for the fortification of Porto Rico?

Colonel ABBOT. There may have been no recommendations made except for the above mentioned four special points. Of course our recommendations were formerly for the lump sum, but even our lump-sum estimates have not up to this time included, in our minds, any money for Porto Rico, nor for any of those other insular ports which the Taft Board estimates included.

Mr. SMITH. As a matter of fact, if any European power except England were engaged in war with us Porto Rico would be a valuable naval station, would it not?

General MACKENZIE. The depth of the harbor is not sufficient at present, but we are engaged now in deepening the harbor.

Mr. SMITH. How deep is the harbor at the deepest point where vessels could lie at anchor?

General MACKENZIE. It is less than thirty feet deep.

Mr. SMITH. What are you deepening it to now?

General MACKENZIE. To about thirty feet; but we are also extending and enlarging it and taking out rocks at the entrance. The entrance is somewhat dangerous on account of the rocks at the sides.

Colonel ABBOT. The area is exceptionally small; no ship drawing any great amount of water can go into the harbor and anchor.

Mr. SMITH. As soon as you get this channel and harbor dredged out, that would be a very valuable base for any European power except England?

Colonel ABBOT. We trust very largely to what the Navy says they need in connection with their operations. The selection of insular harbors must necessarily be greatly influenced by the Navy's judgment.

Mr. SMITH. I have asked you these questions because of the amount of importance which seemed to be attached to the maintenance of the defenses of Hawaii, which is twice as far away as Porto Rico, is it not?

General MACKENZIE. Yes, sir; fully that.

Mr. SMITH. So that a foreign base at Hawaii would be twice as far from our shores as a foreign base at Porto Rico. As a matter of fact, I had the impression, it may be erroneous, that it was only a thousand miles from the American coast to Porto Rico?

General MACKENZIE. It should not be more than that.

Mr. SMITH. And I had the impression that the distance to Hawaii was more than twice the distance to Porto Rico.

General MACKENZIE. I think it is about two thousand one hundred miles.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS, PORTO RICO.

Mr. SMITH. You ask for the purchase and installation of searchlights at San Juan, Porto Rico, \$57,000. What is the need for so large an expenditure for searchlights there in view of the condition of the fortifications of the island?

Colonel ABBOT. The idea of submitting estimates at this time, at the instance of the Secretary of War, was to complete the insular defenses, and if you give us the funds to finish the defenses at San Juan we would need the searchlights at the same time. Each one of these items is intended to close up the insular defenses.

Mr. SMITH. You did not put San Juan in at all?

Colonel ABBOT. No, sir; that was left out. It does not balance.

Mr. SMITH. You do not think you need the searchlights before the batteries?

Colonel ABBOT. No, sir; not before the guns.

Mr. SMITH. You have some small guns at Guantanamo?

Colonel ABBOT. Yes, sir.

Mr. SMITH. What is the largest gun you have there?

Colonel ABBOT. Four six-inch and four three-inch guns is the total.

Mr. SMITH. What have you in the way of searchlights?

Colonel ABBOT. I am not certain whether they sent any searchlight in connection with the torpedoes or not. We had an electric plant for one 30-inch searchlight.

Mr. FITZGERALD. You have nothing there but a target range?

Colonel ABBOT. That is a naval range, but there are the mine-defense buildings.

Mr. FITZGERALD. What is there that would require any defense?

Colonel ABBOT. We do not know exactly what the Navy has done, but they have established a station there of some kind where they have some buildings and a considerable quantity of coal stored.

Mr. SMITH. Very powerful searchlights would be useless there, would they not?

Colonel ABBOT. They want at that locality some very powerful ones and some less powerful ones.

Mr. SMITH. Are powerful searchlights necessary where you have no long-range mortars?

Colonel ABBOT. A six-inch gun will shoot 10,000 yards, which is beyond the limit of a small searchlight.

Mr. SMITH. What is its use?

Colonel ABBOT. It is of value at that range against an unarmored vessel; against an armored vessel it would not be of any value at any range.

Mr. SMITH. Do you know what searchlights, if any, are down there?

Colonel ABBOT. I do not think there are any there. It is possible there is one 36-inch light. I know we had the engine and machinery to supply the power.

Mr. SMITH. Please put into the hearing at this point what searchlights, if any, are there, and what searchlights, if any, provided for have not been installed.

Colonel ABBOT. Yes, sir. I do not think there are any. The oil engine was sent down in connection with the torpedo material.

(Later: One 30-inch searchlight complete is on hand.)

Mr. SMITH. Do you understand that torpedo defenses exist there?

Colonel ABBOT. Yes, sir. I do not know whether they have all the material there, but the buildings are all completed. The Navy has a lot of searchlights on their vessels and in case there was an emergency they could undoubtedly get a searchlight off the ships to cover the mine fields.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS, PEARL HARBOR AND HONOLULU, HAWAII.

Mr. SMITH. The next item is "Pearl Harbor and Honolulu, Hawaii, \$95,000." Like the others that is a complete estimate of the full equipment?

Colonel ABBOT. Yes, sir; of the searchlights for those two places.

Mr. SMITH. To what extent could this estimate be reduced upon the assumption that you get the 14-inch gun emplacement at Honolulu and nothing more at this time?

Colonel ABBOT. It could be divided by two, because the searchlight defense is half of Pearl Harbor and half of Honolulu. If we do not get any more Pearl Harbor money we could at the present time omit that. We will have some 12-inch guns for the Pearl Harbor defense, but until the channel is deep enough for the Navy to use, there is no city on the inside, so there is no hurry about the searchlights at that point.

Mr. GILLET. How soon will the guns at Honolulu be ready?

Colonel ABBOT. That is controlled by whatever we get this year.

Mr. GILLET. This is to complete it?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. How long will it take to build it?

Colonel ABBOT. I should presume about three years. The water is only about two feet deep and there is a good coral foundation under it.

Mr. FITZGERALD. You would have no use for searchlights in the meantime?

Colonel ABBOT. Yes, sir, for the mortars. The mortars will all be ready by that time.

Mr. SMITH. What amount did you say would be necessary to provide searchlights for the mortars at Diamond Head?

Colonel ABBOT. Just about one-half of the estimate.

Mr. SMITH. That is practically all you could use?

Colonel ABBOT. Yes, sir; all that could be utilized in the next year.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS, GUAM.

Mr. SMITH. The next item is, "Guam, \$57,000." What have you there?

Colonel ABBOT. No defenses.

Mr. SMITH. There is no necessity of any of this money being appropriated at this time?

Colonel ABBOT. No, sir.

Mr. FITZGERALD. What is the total population of Guam?

Colonel ABBOT. There is a pretty large native population.

Mr. FITZGERALD. I mean the population outside the native?

Colonel ABBOT. There are extremely few.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS, SUBIG BAY, PHILIPPINE ISLANDS.

Mr. SMITH. The next item is, "Subig Bay, Philippine Islands, \$95,000." What would be a complete equipment of what is now planned to have at Subig Bay, provided nothing further is done there?

Colonel ABBOT. We ought to be able to get along with about half of the estimate. I am not familiar with the exact details.

Mr. FITZGERALD. Have you the lights for the guns already mounted?

Colonel ABBOT. There are two 10-inch, four 6-inch, and eight 15-pounders. They cover a very wide field. You need a considerable number of lights there to illuminate the field covered by those guns.

Mr. FITZGERALD. I thought it was a narrow entrance?

Colonel ABBOT. The channel is about a mile wide, but you have to pick up ships as they enter and that means a long range. You can not follow a ship all the way around on account of trees and obstructions. You will have to have other lights there.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS, MANILA, PHILIPPINE ISLANDS.

Mr. SMITH. The next item is "Manila, Philippine Islands, \$114,000." We gave you \$30,000 last year. This is the balance of the complete estimate for the Philippine Islands?

Colonel ABBOT. Yes, sir.

Mr. SMITH. How much is required for a reasonable supply of lights for what fortifications you have there or will have in the next year or two? You will not need any searchlights for two or three years on Carabao Island?

Colonel ABBOT. Yes, sir; we would want to provide parapets for those while we are constructing emplacements: when you are putting up one kind of structure you want to get the parapet to cover it. If one parapet protects both, the searchlight ought to pay for its own proportion of the common embankment.

Mr. SMITH. That is to say, when you have an appropriation for the battery and another one for the searchlight you pay part of the substructure expense out of the searchlight appropriation?

Colonel ABBOT. Not the substructure, but the parapet. The battery only requires a certain amount of parapet. A searchlight if built by itself would require a certain amount of parapet, but by putting the two close together the searchlight gets the benefit of the front parapet and the battery gets the benefit of the side parapet. Under those circumstances we make each of those items pay their equitable proportionate part of the cost.

Mr. FITZGERALD. Are the searchlights located close to the battery?

Colonel ABBOT. The searchlight is off at the end of a flexible conductor. The power plant is never near the searchlight.

Mr. FITZGERALD. The power plant will be required anyhow?

Colonel ABBOT. A certain part of it. We generally put these things in units, at the present time of about 25 kilowatts. What we would actually do out there in connection with this 14-inch battery on Carabao Island would be to have a 25-kilowatt machine for the battery and a 25-kilowatt machine for the searchlight, and a third one which would be used to reinforce either or take the place of either in case of a breakdown. That is the way we generally figure.

Mr. SMITH. What do you think would be the requisite amount to appropriate in addition to what you have already received for the searchlights at Carabao and Corregidor islands?

Colonel ABBOT. The area is just as big as though it was now covered by the whole projected defenses, and we want the whole amount. We have not *all* the guns to cover the water, but they partially cover the entire area. All the water is now covered by a small number of guns, and so the area to be covered is the same as it would be for the complete project. We need all of this \$114,000. It is useful to illuminate the field that is swept by the guns on Corregidor Island now, and we will need the balance as soon as the 14-inch emplacements are completed.

Mr. FITZGERALD. How long will that take?

Colonel ABBOT. Probably two years. We have enough funds on hand at the present time to buy the plant and get the wharf on Carabao Island. They are working on that now. We need money to buy the steel and other materials for the 14-inch battery. That will have to come out of this appropriation, but it is not like a case where we have not made a start. If we do not make the preliminary arrangements for beginning it takes a long time to get the plant, because it has to be bought in the United States and shipped across the Pacific and that runs into months.

Mr. GILLET. Suppose we did not give you any appropriation for the lights and you were building the parapets, would you build simply the parapet for the gun when you knew that you would have to have the lights?

Colonel ABBOT. Yes, sir.

Mr. GILLETT. And afterwards when you got the appropriation for lights you would go ahead and build that parapet?

Colonel ABBOT. We have not the right to assume that we are ever going to have lights; we have not the right to assume that Congress is going to make the appropriation. A case in point: The fire-control system now requires a battery commander's station to be constructed in the rear of the battery. The provision for new batteries covers the construction of that building in connection with the battery; it is part of the battery, but in the older batteries. We do not now build them out of the battery-construction funds but out of the fire-control funds. The question merges into itself in each case. If the parados was needed to protect the rear of a battery on Carabao Island we would build it now and then afterwards we would probably put the searchlights in behind it without charging anything against the searchlight appropriation, but if we had the two appropriations available at the same time, we would probably make each pay its proportionate part. We try to keep them as separate as we reasonably can.

Mr. GILLETT. Do you consider that the law?

Colonel ABBOT. It is a matter of right rather than the law.

Mr. GILLETT. And you do not consider that you have the right?

Colonel ABBOT. Not the right to interpret what Congress means.

Mr. FITZGERALD. Is it not merely bookkeeping?

Colonel ABBOT. No, sir; it would be malappropriation of funds if we built the parapet out of an inapplicable appropriation.

Mr. FITZGERALD. When you build a battery you must put in a power plant for the battery?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. And in order to put in the searchlights you must enlarge the power plant more or less?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. And wherever you put the power plant you put it in such a place as will enable you to enlarge it to be utilized to operate the searchlights?

Colonel ABBOT. Wherever we can, we do that.

Mr. FITZGERALD. It is a rare instance where it is not done in that way. You would not build a parapet that would protect so much of a power plant as would be required for the purposes of the battery and then omit to build at that time that part of the parapet that would be required to protect the extension of the plant, if afterwards the searchlights were authorized?

Colonel ABBOT. Probably not in this particular case, but I was illustrating the general principle that we tried to make each appropriation bear its fair share of the work done.

Mr. FITZGERALD. I understand that, but following up Mr. Gillett's question as to whether you would build just so much of a parapet and then stop, knowing that if the searchlights were afterwards authorized you would merely extend the power plant then already provided, it seems to me it would require practically the same power plant?

General MACKENZIE. It is an extension and we would not use the money at that time, because we would not build it at the same time.

Mr. FITZGERALD. I could understand the position if they were to be separate power plants for the battery and for the searchlight.

Colonel ABBOT. In a great many cases that is true.

Mr. FITZGERALD. How many lights does this \$114,000 provide for, in addition to the \$30,000?

Colonel ABBOT. I can put that into the hearing. (6 60'' search-lights.)

Mr. SMITH. You gave us a year ago a statement of the average cost of the various lights?

Colonel ABBOT. Yes, sir.

Mr. SMITH. Can you state the average cost of the various size lights?

Colonel ABBOT. I can give you the approximate cost. The cost of the 60-inch light is about \$17,000, and my impression is that the cost of the 36-inch light is from \$8,000 to \$9,000, dependent upon how it is mounted. That includes the complete light, with its plant, and the average amount of conductor, and the tower on which it is built, and whatever protective parapet is built. Erection costs additional in the Tropics.

Mr. SMITH. That is the theory on which we gave you two of the best equipped and largest-sized lights?

Colonel ABBOT. Yes, sir.

Mr. GILLETT. Does each light have a power plant?

Colonel ABBOT. That depends on how they are related. The lights are put where they illuminate the area we want to light up. Sometimes we use 50-kilowatt machines, but generally they are far apart and we use two 25-kilowatt machines. We do not have them close to the lights on account of the danger of being hit by projectiles fired at the light. Generally they are some distance away.

SUBMARINE MINES: INSULAR POSSESSIONS.

Mr. SMITH. For the defenses of Honolulu and Pearl Harbor, Hawaii, you ask \$129,000. Last year we gave you \$200,000 while you asked for \$382,500. Has something been eliminated from this project that you thus concede us \$52,000?

Colonel ABBOT. That estimate has been submitted at the request of the Chief of Artillery.

Mr. SMITH. As I understand it, if we give you the \$129,000 for which you now estimate it will complete all the work now in contemplation in the insular possessions?

Colonel ABBOT. Yes, sir; possibly, except San Juan.

Mr. SMITH. I would like to inquire whether this is an increased estimate in fact or a decreased estimate. In place of your asking for the balance you have asked for \$52,000 less than the balance of the original estimate.

Colonel ABBOT. That is because there was a large appropriation for the torpedo defense of Manila by which, together with the appropriation you gave us last year, we were enabled to finish up over there.

Mr. SMITH. Is there anything covered by the Taft Board in the insular possessions which will be left incomplete if we do not give you the \$52,000?

Colonel ABBOT. No, sir; on account of an appropriation which we discovered last year which was made in 1898.

Mr. SMITH. How much was it?

Colonel ABBOT. Something like \$150,000.

Mr. SMITH. Then, as a matter of fact, you raise the estimate over last year?

Colonel ABBOT. Yes, sir. We had money that we did not know we had. This sum we put in, \$129,000, does not include the submarine defense of San Juan or Guam or Kiska Island.

Mr. SMITH. Were they included in the estimate of last year?

Colonel ABBOT. I have not the last year's estimates before me, but they were not, I am very sure.

Mr. SMITH. So, as a matter of fact, since last year you have raised the estimate for this purpose \$100,000 in round numbers?

Colonel ABBOT. Due to the discovery of this old appropriation. You did not give us last year what we asked, but we found later that we had this old money which practically made up the difference between what you gave us and what we asked and we came out practically even with the work estimated. This is what we intended to do last year. This appropriation now extends the submarine defense, leaving the Philippine Islands complete, takes up the question of completing the mine defenses of Honolulu and Pearl Harbor, but does not come over to this side into Guantanamo or San Juan, or the Aleutian Islands or Kiska Island.

Mr. SMITH. This is an increase practically of \$100,000?

Colonel ABBOT. Yes, sir. The cost has been greater than the estimate, about that amount practically.

Mr. GILLET. How did you discover the \$150,000?

Colonel ABBOT. It was shown in a statement that came up from the bookkeeper of the engineer department that the fund had not been drawn on for a number of years. The Engineer Department transferred the torpedo defenses by the act of Feb. 2, 1901, and these funds could not be spent till Congress again opened the defense question in the Philippines. The matter was overlooked after a while.

Mr. SMITH. The appropriation was made at the time the Engineer department was in charge of the torpedo defense?

Colonel ABBOT. Yes, sir; it was one of those things which get lost in the shuffle.

Mr. FITZGERALD. How much of the amount is required for Honolulu and how much for Pearl Harbor? Are they expressly asking for submarine defense for Pearl Harbor?

Colonel ABBOT. Yes, sir.

Mr. FITZGERALD. To protect it against what?

Colonel ABBOT. Anything that might come in there.

Mr. FITZGERALD. What can go in there aside from row boats or launches?

Colonel ABBOT. There is a depth of thirty feet, but it is too crooked for a naval vessel to go in there.

Mr. FITZGERALD. When I was there a man thoroughly familiar with the conditions told me that one time they managed to take in a boat of three hundred tons. We went in on an ocean going tug of about two hundred and fifty tons, and it was all they could do to take that boat in. Is the War Department seriously submitting estimates for submarine defenses to keep boats like that out of Pearl Harbor?

Colonel ABBOT. On the same theory that we submitted the other estimates this year.

Mr. SMITH. How much of this appropriation is distinctly for Pearl Harbor?

Colonel ABBOT. About one-half.

General MACKENZIE. I think it was the idea that the estimates would all work together.

Mr. FITZGERALD. Has an estimate been submitted for enlarging the channel?

Colonel ABBOT. Not under us; the Navy Department has that in charge and are using their efforts to secure an appropriation for that work.

Mr. GRAFF. As I understand the Colonel, he says that one-half of this estimate is necessary for Honolulu?

Colonel ABBOT. Yes, sir.

Mr. SMITH. Half of the estimate is necessary for Pearl Harbor and the other half for Honolulu?

Colonel ABBOT. Yes, sir.

PURCHASE OF LAND, PHILIPPINE ISLANDS.

Mr. SMITH. The next item is, "For procurement or reclamation of land, or rights pertaining thereto, needed for the site, location, construction, or prosecution of works for fortifications and coast defenses in the Philippine Islands, \$5,000." You state here in the note that, "Certain lands have been reserved in the Philippine Islands by Executive Order for sites for fortifications, the reservations being made subject to the property rights of private individuals already existing." What are these lands?

Colonel ABBOT. In one of the cases there are about thirteen or fourteen houses and lots in the town of San Jose on Corregidor Island, which it is very essential for us to buy. It was supposed that the adverse titles were not valid, but the land court in the Philippine Islands has decided that the titles are valid and the people own the land where we have our wharf and where we have our torpedo structures.

Mr. SMITH. And the total cost of that is \$5,000?

Colonel ABBOT. It is to be condemned and we do not know what it will amount to. We ought to have \$5,000 to cover this and some other cases which might possibly develop. We do not know of any except this one case at the present time, but the demands of the owners are for more than \$5,000. I do not think the land should be condemned for more than \$5,000. I think it should be condemned for less, but in the court out there it is a little hard to say.

Mr. FITZGERALD. This does not cover the artificial island?

Colonel ABBOT. No, sir; they have no claims on the artificial island.

TUESDAY, February 18, 1908.

ORDNANCE DEPARTMENT.

ARMAMENT OF FORTIFICATIONS.

STATEMENT OF BRIG. GEN. WILLIAM CROZIER, UNITED STATES ARMY, CHIEF OF ORDNANCE, ACCOMPANIED BY MAJ. L. M. FULLER AND MAJ. J. E. HOFFER, ASSISTANTS.**PURCHASE, MANUFACTURE, AND TEST OF MACHINE AND AUTOMATIC GUNS.**

Mr. SMITH. Your first item is on page 10 of the bill, "For the purchase, manufacture, and test of machine and automatic guns, including their carriages, sights, implements, equipments, and the machinery necessary for their manufacture at the arsenals?"

General CROZIER. \$110,000 is the amount estimated for, Mr. Chairman, and that estimate is somewhat difficult to defend because it is so small. Last year there was estimated \$70,000 and \$30,000 was the sum appropriated, \$40,000 short of the estimate. Now, this year I have estimated on the plan of the \$70,000 estimated for last year and adding to that the \$40,000 which was not appropriated last year, making the estimate \$110,000. That will buy about 35 machine guns, with what goes with them. We need these machine guns for two purposes. About 200 are estimated as being required for the seacoast fortifications, for the repelling of land attacks, and that will include the Atlantic, Pacific, and Gulf coasts, and will be the total number expected to be required. The remainder are for use with the mobile Army.

The scheme adopted and under which the estimate is submitted now is to have a platoon of two of these guns for each regiment of infantry and for each regiment of cavalry. On that basis of organization it will require for an army of 600,000 infantry and 50,000 cavalry 1,300 of these guns. There are some 50 of them which have been issued, from the 563 which we already have, to transports, to insular possessions, and to Alaska, which 50 it would be exceedingly difficult to get back at the outbreak of war, and so we can not consider them among the 1,300 which will be required for the infantry and cavalry. That would bring the total number required up to 1,550. As I stated a moment ago, we have already on hand or under manufacture from appropriations which have been made 563, and this will leave 987 still to be provided for. This estimate would provide 35 of these guns and if it is to be continued at the same rate you can see how many years it will take to get 987. So I say, it is difficult to defend this estimate because of its smallness. If these things are a necessary part of the armament of the field army, which is the main object of the estimate, the rate should be increased, and if they are not, why, there is no use of getting them at all.

Mr. SMITH. What is the difference between the cost of one of these guns mounted on wheels and one mounted on a tripod?

General CROZIER. The difference between \$989 and \$536.

Mr. SMITH. The wheel mount being more expensive?

General CROZIER. The less expensive, \$536.

Mr. SMITH. How can it cost \$400 a gun more to mount it on a tripod?

General CROZIER. The tripod itself is much less expensive than the wheel carriage, but with the tripod you have to have a pack outfit, the cost of which is \$800. That is for five mules. The point is this, the wheel mount costs \$536 and the tripod \$189, and if you did not have to carry them, that would represent the difference in cost. The wheel mount transports itself, but you have to have five pack saddles, bridles, and everything else for five mules to carry the gun and tripod; that is \$160 per mule or \$800.

Mr. SMITH. The wheel mount is for use in the seacoast fortifications?

General CROZIER. Yes, sir.

Mr. SMITH. And the tripod mount is used by the infantry and cavalry?

General CROZIER. Yes, sir.

Mr. SMITH. The total army the United States could bring into use, including the enrolled militia, would be about 200,000 men?

General CROZIER. If the Regular Army were up to its maximum force that would be approximately the case.

Mr. SMITH. There is about 100,000 enrolled militia?

General CROZIER. Something like that, but the Regular Army is much below the 100,000 allowed by Congress.

Mr. SMITH. About one-half?

General CROZIER. The present regulation strength is about 70,000.

Mr. SMITH. Is not the total authorized Army more than 100,000, in view of the seacoast artillery?

General CROZIER. The maximum was not increased on that account. In reference to the size of the force for which these guns should be provided, I have considered an estimate of 650,000 men. In providing what are called the ordinary soldier's equipments and horse equipments, such as haversacks, canteens, saddles, bridles, etc., before the other committee, I had in mind and mentioned to the committee an army of only 350,000. The reason for considering the smaller number in that case is that the articles which I have just mentioned are much more easily manufactured. We have a plant at Rock Island capable of turning them out in large quantities, while if we should give an order for fifty of these machine guns we certainly would not get them within a year.

Mr. SMITH. Are these guns all manufactured under contract?

General CROZIER. Thus far they have all been manufactured under contract.

Mr. SMITH. You have a plant for the manufacture of automatic machine guns?

General CROZIER. No, sir. We have a plant at Springfield, which by the addition of some machines, could be used for the purpose. For instance, we could make the barrels up there, which is an important part, and I suppose we could install the other machinery.

Mr. SMITH. Do you buy them in the United States?

General CROZIER. Yes, sir. They were adopted as the result of a competitive test when this British gun, the Vickers-Maxim gun, won out. I suppose it is fair to call it an English gun, although the inventor is a well-known American, Mr. Maxim. I required as a condition

that the manufacture should be domesticated in this country and that is now the case. They are all manufactured in Connecticut.

Mr. SMITH. Are they manufactured by an English company?

General CROZIER. They are manufactured by an American company.

Mr. SMITH. Are these guns manufactured for nobody but the United States?

General CROZIER. In this country?

Mr. SMITH. Yes, sir.

General CROZIER. I know of no other purchaser. I have not heard of any orders from any foreign country being received by the establishment which manufactures them for us.

Mr. SMITH. Do not the States buy these guns at times?

General CROZIER. No, sir. The States get them from the United States Government. We furnish them to the States and charge them to the quota of the States under the \$2,000,000 annually appropriated for equipping the militia.

Mr. SMITH. They are not bought out of this appropriation?

General CROZIER. No, sir. We furnish them from this appropriation and the amount is replaced at once by transferring the funds from the militia appropriation.

Mr. GRAFF. How is that appropriation made, through the Military Committee?

General CROZIER. It is Paragraph 1661, of the Revised Statutes, amended. It is a permanent, definite appropriation.

Mr. SMITH. Do you know how many of those guns have thus been supplied to the militia?

General CROZIER. Of the 563 which I spoke of having on hand, thirty have been issued to the militia. These 563 guns, which are all serviceable, are not all of the Vickers-Maxim model, which is the latest model, but they all use now the same ammunition, and the thirty which I mentioned as having been issued to the militia are partly Gatlin and partly Colt automatic guns.

Mr. SMITH. Are all the guns that have been bought out of the permanent appropriation of \$2,000,000 a year for the militia or the previous appropriation of \$1,000,000 for the militia, included in the 563 guns?

General CROZIER. Yes, sir. All the guns we have in existence which would be useful to the United States are counted in the 563, the total available number which would be useful in case of necessity.

Mr. SMITH. That would leave about 313 guns that have not been assigned to transports or to any other purpose and now on hand?

General CROZIER. Some have been issued to the Army.

Mr. SMITH. Those would be immediately available. You spoke of the 250 not being immediately available?

General CROZIER. Where they would be useful, but where they were not for the mobile Army.

Mr. SMITH. How large an army would the 313 guns provide for with the regulation number of automatic guns?

General CROZIER. 155 regiments, and if the regiments were a thousand that would be 155,000 men. The regiments are usually a little larger, 1,200 when up to their full strength, but they are not often up to their full strength.

Mr. SMITH. Would they not be in time of war?

General CROZIER. As nearly as they could be kept up to their full strength; so I should say, 155,000 men.

Mr. SMITH. According to your experience, how long a time has expired between the time you let a contract for these guns and the time you got a delivery?

General CROZIER. There is only one company that has a plant to make them, and our experience in the past has been worse than we hope it will be in the future, because they have been getting their plant in order and have been improving it. It has been about two years' time after the placing of an order before the order was filled. I think now, as a guess, that we might get, perhaps, one hundred of these guns within a year after placing the order.

Mr. SMITH. Have you any knowledge whatever as to how many of this type of guns any other nation maintains?

General CROZIER. Yes, sir; in this way: We were a long time studying the question before we arrived at this tactical organization of two guns per regiment, and in making that study we consulted the practice of all the civilized armies of the world, got all the information on the subject that we could get, and as a result of that study and comparison this number was fixed upon. I think it is a little less than the majority of them consider best.

I will say, if it will be of any interest to the committee, that there are two general methods which could be followed in fixing the machine-gun organization. One is to collect them into batteries of four or six guns per battery and have the batteries independent of other bodies of troops, just as the batteries of field artillery are. The other is to regard them as small-arm weapons, concentrated infantry fire, and attach them to organizations which have small-arm fire such as to the cavalry and infantry organizations. The second method is the one we have adopted.

Mr. SMITH. Are they of no use in defending batteries from capture; are they of any use at all in connection with the field artillery?

General CROZIER. That is one of the uses which has been spoken of for them, but inasmuch as the batteries of field artillery are never brought under close fire, if we can help it, the occasion when they would need to be defended by these guns would be a rare one. For that reason it has not been thought worth while to provide for it.

Mr. SMITH. Batteries of artillery are frequently captured?

General CROZIER. Not in recent wars. They are behind the infantry. They have a greater range. They are often behind hills or villages or groves of trees. In that manner they take advantage of their greater range than the infantry.

Mr. SMITH. I was not asking what you knew about other countries design of how many of these guns should go to a regiment or whether they should be put in batteries, but have you any information at all as to the gross number of guns of this type held by any other country?

General CROZIER. It is very difficult to get that information. We could, I think, work it out through their organizations. It is a little easier to get the organization of their army than it is to get the actual amount of material they have. They guard that very jealously.

Mr. SMITH. Of course, on the same basis they would estimate that we would have 1,500 of these guns?

General CROZIER. Yes, sir; if they knew we were estimating for an army of 650,000 men. That brings me to another point. I think it is practically the universal practice in Europe, both in

England and on the continent, when a new model of any military weapon is adopted to supply the service with the full amount of that new model of armament as rapidly as the manufacturers of the country can produce it. They do not expand the procurement over a series of years as we do; they get it all at once, as rapidly as they can turn it out.

Mr. SMITH. How rapid has been the change in the model of these machine guns in the last 25 years; has it not been very constant?

General CROZIER. The Gatling gun is one of the type machine guns and it is still a useful gun. There has been a change of caliber, the use of smokeless powder and some change in the bullet requiring the construction of a new model of gun. The Gatling gun is about 40 years old. Then after that, along late in the 80's or early in the 90's, came the automatic gun. That is the gun which loads and fires itself. That took the place of the Gatling gun which was operated by hand power or by some motive power. The last was simply an experiment. The automatic guns have been going on and improving as everything else, but the automatic guns which were in use nine or ten years ago are still useful and serviceable and we would not replace them by other guns. We have them and do not intend to replace them at the present time. The last gun, the Vickers-Maxim gun, which we have adopted, we adopted about four years ago, and we do not think there is anything better yet in sight.

Mr. FITZGERALD. You are asking for 1,550 of these guns?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Last year and the year before that the number you estimated for as the maximum was 935, and that was based upon an organization of 360,000 men?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Why this marked increase?

General CROZIER. Because of the time required to get the guns. That is the only reason.

Mr. FITZGERALD. Would the time required to get the guns make any difference in the number of guns required?

General CROZIER. Not a bit.

Mr. FITZGERALD. The maximum number you asked for was 935 and we had in 1907, 227 of them and needed 708. Now we have 563, about 60% of the total number estimated, and then the number estimated for increases just about 50% more than we have acquired. Why do we want, instead of 935, the number fixed in 1906 and 1907, 1,550 of these guns in 1908?

General CROZIER. Did I not state last year the size of the army the 935 would be required for?

Mr. FITZGERALD. 360,000.

General CROZIER. This year I say 650,000. In other words, I am saying to you now that I think it would be advisable to procure these guns for an army of 650,000 men rather than one of 360,000 men.

Mr. FITZGERALD. How could the United States in case of war utilize an army of 650,000 men unless we had a war between the States themselves? Where would they operate or could you conceive of any situation where you could utilize an army of 650,000 men for which you ask us to provide equipment?

General CROZIER. If we should have a coalition against us and there should be included in the coalition nations who could easily

dispose of a million or more men, if they were to attempt to carry on operations on this side of the water they would have no difficulty in transporting them here, provided they had the use of the sea, not denied them by the Navy. The sea furnishes the best and most convenient means of transportation for troops that there is.

Mr. FITZGERALD. Is there any board or body that determines the size of the Army upon which estimates are submitted for equipment?

General CROZIER. The War College is the nearest body we have to such a board. They have not formulated and had circulated among the staff departments authoratively the number of troops that should be provided for; this is my own estimate—

Mr. FITZGERALD. In two years we have more than doubled the number of the guns we had on hand. If in the next two years we double the number again so as to have a thousand of these guns, how are we going to fix the maximum number that the authorities really believe we should have?

General CROZIER. By considering, it seems to me, a reasonable army to be prepared for.

Mr. FITZGERALD. My recollection is that the committee endeavored to authorize the acquisition within a comparatively short period of the maximum number of guns estimated as necessary, and it has gotten up in two years to 60 per cent of the number, and as soon as we get to that point, then an estimate is submitted, based upon an entirely different organization, which increases the number required by the number originally estimated for?

General CROZIER. In the first place, as to the 227 guns that you are speaking of, I do not think you have taken into consideration all of the different kinds of guns we have. I think that only takes into consideration the Vickers-Maxim gun and not the Colt and Gatling guns which are still serviceable and which we do not intend to replace. In addition to that you say in two years you have gone from the smaller number to the larger number. The appropriations in those two years were \$63,000. We had some money which accumulated while we were endeavoring to change the model. We had that money and the money that you gave me last year was only enough to secure about ten guns.

Mr. FITZGERALD. I am not talking about the appropriation. It is not the size of the appropriation that is startling me, but the fact that as soon as we get near what might be called the completion of this particular equipment, it immediately becomes necessary apparently to provide a greatly increased number?

General CROZIER. Perhaps, I might make a little further explanation of that. This estimate of 350,000 men is the one which I have had in mind to provide the equipment which could be easily and quickly produced, and last year not having so much experience in the procurement of these guns, it did not impress me so much that it was necessary to get a larger number of them in preparation for war because it would take so long to procure them, and we can not count on making so large an increase in the supply after war should become imminent as we can in reference to the more quickly procured equipment.

Mr. FITZGERALD. If you had the 935 guns believed to be sufficient last year, would you not think that you were very well supplied?

General CROZIER. We would be a great deal better off than we are now.

Mr. FITZGERALD. I know, but would you not be very well supplied with guns of that type?

General GROZIER. It would all depend. Suppose we should be called upon to equip a larger army than that?

Mr. FITZGERALD. This increased number is merely upon the assumption that it might be necessary to utilize an army of 650,000 men in the field?

General GROZIER. Yes, sir.

Mr. FITZGERALD. If an army of 650,000 men were in the field would you require for each organization the two guns or would some of them be utilized in such a way that they could not use these machine guns?

General CROZIER. There is nothing which would make you suppose in advance that they would not all be likely to need them. They are a part of the armament just as much as the musket. The tendency, if there is any change in this organization, will be to increase the number. We have assigned six of these guns to the 28th Infantry, a machine gun company, to see how that organization will work, but I have assumed that we would not develop an organization that would require six guns to a regiment; I do not think we will. 200 guns are required for the seacoast fortifications for defense against landing parties. That was referred to in the hearings last year.

Mr. FITZGERALD. But the maximum number estimated as required was 935?

General CROZIER. Yes, sir.

Mr. FITZGERALD. That included the 200 guns for the fortifications as well as the equipment of the army in the field?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Now, you see, we have gone up 615 additional, or the number still to be provided is 52 more than the original number estimated as necessary?

General CROZIER. Yes, sir. That is because we are considering a larger army.

Mr. SMITH. I did not quite understand when you said there were 563 guns whether that was the number of guns you actually had delivered or whether that was the number covered by all existing appropriations.

General CROZIER. The latter figure.

Mr. SMITH. What is the state of this fund?

General CROZIER. The balance in the Treasury to the credit of the appropriation on the 13th of February was \$223,613.70, the amount outstanding, obligated by contracts, was \$198,409.76, the amount which is due to arsenals on orders for manufacture, which manufacture is in process, is \$7,288.28. That leaves an unallotted balance of \$17,915.56.

Mr. SMITH. What is the annual capacity for the manufacture of this type of gun at the factory?

General CROZIER. The roughest kind of an estimate, based upon some information I have had from the manufacturers, makes the capacity about 200 guns a year. That is pretty rough. That is to say, I am not very decided about it. The capacity has been considered greater than we have been able to employ and the manufacturers say that they can scarcely employ their plant profitably on such a small number of guns as we give them to manufacture.

Mr. SMITH. You spoke about the difference between the speed of manufacturing these guns and of the other equipment that you produce at the Rock Island Arsenal?

General CROZIER. Yes, sir.

Mr. SMITH. Why would it not be entirely feasible to acquire these guns and not acquire the pack saddles, and so forth, and why could these not be readily produced at your arsenal when you did need them?

General CROZIER. And consequently cut down the total appropriation and procure that part of the gun which it takes longer to produce and leave the guns without that portion of the outfit which we produce ourselves, and get that later on when war became more imminent? That could be done.

Mr. SMITH. Is it not a fact that the pack saddle and the like of that is subject to deterioration by age to a greater degree than the guns?

General CROZIER. Yes, sir; but we are able to store our leather and canvas work so that it holds up very well.

Mr. SMITH. What would you think was the life of a saddle such as you manufacture in storage before the leather becomes entirely dead?

General CROZIER. During the time I have been the Chief of Ordnance, some six years, I have not had occasion to recover any saddles, that have been kept in storage, on account of the deterioration of the leather.

Mr. SMITH. That would not be ascertained until you took them out and used them?

General CROZIER. We are always taking them out and issuing them for use.

Mr. SMITH. The oldest ones you have?

General CROZIER. Yes, sir.

Mr. SMITH. Would it not be a good policy to expend the appropriation largely for guns in view of the long time that it takes to get them?

General CROZIER. We have followed that process to a certain extent. The accessory outfits for these guns are not up now. We have 560 of the guns, but we have not a corresponding number of everything that goes with them. I understand what you mean, that we should follow the policy of procuring the guns, but not procuring the parts that can be more readily procured.

Mr. SMITH. It seems to me that should be the policy?

General CROZIER. That policy might be followed, and in that case we could get the 987 guns and only a proportion of what goes with them for less money than it would cost to get the whole thing.

Mr. SMITH. How much did you say a wheel automatic gun cost?

General CROZIER. The greater number are not put on wheels.

Mr. SMITH. I understand.

General CROZIER. The completed outfit, gun, carriage and accessories, cost about \$2,600.

Mr. SMITH. What are the accessories of a wheel mounted automatic gun?

General CROZIER. There are certain tools, wrenches, and things of that kind that go with the gun. There is a set of spare parts, springs, and things of that sort. There is an ammunition box. There is a water box which carries water to keep the barrel cool

under rapid fire. Then there is an attachment which goes with the gun for drilling when they are not firing ball cartridges. They use blank cartridges in the drill.

Mr. SMITH. All of those things are common to both types of gun?

General CROZIER. Yes, sir.

PURCHASE, MANUFACTURE AND TEST OF MOUNTAIN, FIELD AND SIEGE CANNON.

Mr. SMITH. The next item is, "For the purchase, manufacture, and test of mountain, field, and siege cannon, including their carriages, sights, implements, equipments, and the machinery necessary for their manufacture at the arsenals?"

General CROZIER. There is another similar speech to be made on that subject. I am looking forward to the procurement of 250 field batteries for the armament of the troops in case of war.

Mr. SMITH. What would that correspond with as to the whole force of the army?

General CROZIER. At the rate of two guns per thousand, that would be an army of 500,000 men.

Mr. SMITH. So your aim here is for an army of 500,000 men rather than 650,000 men?

General CROZIER. That is not very consistent, but I have made that difference in the figures because I commenced here several years ago to speak of the 500,000 men and I have stuck to it. There is no good reason to have 500,000 in one case and 650,000 in another. It takes a long time to make this material and we should have it in advance, but I am so far short of the proper number for 500,000 men that I did not take into account the difference in the size of the force in the two cases. Counting on 15 batteries of siege guns 4.7-inch caliber and 15 batteries of siege howitzer, 6-inch, at the rate of \$800,000 per year, which I am asking for here, it would take 24 years to get that number of guns, and the only way of diminishing that interval is to either increase the rate of appropriation or to utilize converted guns of the type we have just been getting, for which I have made an estimate later on and which I will speak about when we come to it. There are something like 250 of those guns that could be thus converted.

Mr. SMITH. If you had only that many guns of the old type, how was this army of 275,000 men that was mustered in for the Spanish war equipped as to artillery?

General CROZIER. They were not well equipped at all, and if it had been a case of war with a first-class power provided with proper artillery we would have been rather badly off. Last year, as you remember, you appropriated \$300,000 for this purpose, my estimate having been \$800,000, and the year before that you appropriated \$500,000, and the year before that \$600,000. We have of these batteries in existence 48 which have been procured out of the appropriation for the militia made in the Army bill, and 45 procured out of the appropriation made for the Regular Army, making 93 batteries of the 250 that we think we ought to have. I think, Mr. Chairman, that the rate should be increased beyond the amount which I have estimated.

Mr. SMITH. Tell us when this new model was adopted?

General CROZIER. In the winter of 1902-3 we considered the adoption as final.

Mr. SMITH. That accounts, does it not, for the constant rise about 1904, 1905, 1906, and 1907 in the appropriations for this purpose?

General CROZIER. Yes, sir; that is the reason for it. I stated to the committee on several occasions before that we were not ready to go ahead and supply the guns of the new model.

Mr. SMITH. How many of these batteries are required for the Regular Army establishment as now existing?

General CROZIER. 36, 24 field batteries and 12 mountain batteries.

Mr. SMITH. The existing number then is substantially adequate for the regular establishment and for the enrolled militia?

General CROZIER. Substantially; yes, sir.

Mr. SMITH. So that whatever we give you hereafter is distinctly reserve?

General CROZIER. Yes, sir.

Mr. SMITH. Are these guns constructed wholly by you or by contract?

General CROZIER. Most of the guns themselves are manufactured by the government at the Watervliet Arsenal, but we have had some manufactured by the Bethlehem Steel Company and by the American-British Ordnance Company, of Bridgeport, Connecticut. Those are the only three establishments that have made the guns. The limbers and caissons are made by other establishments as well, two or three others.

Mr. SMITH. In this case as in the case of the automatic gun, is there some portion of the work that would take longer time to do and a proportion that could be more speedily done?

General CROZIER. I should hardly say so, although it is possible that the limbers and caissons may be procured more readily. The estimate which I give here does not include for the regular service the personal equipment of the men and the harness for the horses. That is procured for the regular artillery out of another appropriation. I might say there are other establishments in the country that can manufacture these guns; the Bethlehem Steel Company and the Midvale Steel Company can manufacture them, but they are not manufacturing them for us now. It might be possible that we could procure the limbers and caissons more readily than the guns.

Mr. SMITH. How long does it take you now to procure the guns after you order them? I suppose that depends on how many you order at one time?

General CROZIER. What seems to set the pace of the delivery is the gun carriage, which takes a longer time to manufacture than the gun itself, and the rate of delivery we have had on those carriages has been about a year's time for something like a dozen carriages.

Mr. SMITH. The reason why it takes longer under your new model is that the carriage is practically a machine?

General CROZIER. Yes, sir, and of course the delivery of the raw material takes a long time. Most of the manufacturers of steel live from hand to mouth. The material has to be made from the ground up after the receipt of the order.

Mr. SMITH. How many batteries would be required to completely equip an army of 350,000 men?

General CROZIER. About 175.

Mr. SMITH. That would be about 80 more than you have now?
General CROZIER. Yes, sir; we have now about 93.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR MACHINE
AND AUTOMATIC GUNS.

Mr. SMITH. The next item is, "For the purchase, manufacture, and test of ammunition for machine and automatic guns, and for mountain, field, and siege cannon, including the necessary experiments in connection therewith and the machinery necessary for its manufacture at the arsenals?"

General CROZIER. Of this class of material we count on procuring enough ammunition to fill all the chests of the limbers and caissons, and the sum I have estimated here would provide with the quantity on hand and under manufacture about 88 per cent of the ammunition which would be necessary to fill the chests of all the field guns which have already been provided, not including those in this estimate.

Mr. SMITH. Of course this is a constantly increasing percentage; that is, you are not using this reserve to amount to anything?

General CROZIER. We are constantly adding to it. The ammunition procured under this appropriation is not used for target practice.

Mr. SMITH. So whatever you get, every year you are drawing nearer the 100 per cent?

General CROZIER. Yes, sir. This is not a large allowance which I am counting on, simply enough to fill the chests, because this ammunition can be procured fairly rapidly. It is not very large and we have a plant of respectable capacity at the Frankford Arsenal, and there are private plants which can make it. Otherwise, we would want a much larger reserve than to send our batteries into the field with their chests full and nothing behind them.

Mr. SMITH. Does this include the automatic guns?

General CROZIER. Yes, sir.

Mr. SMITH. That ammunition can be bought almost immediately at any time?

General CROZIER. Not quite as nicely as that. It takes people some time to manufacture it after they get the order; but I will say there are four establishments in the United States, besides the Government establishment at the Frankford Arsenal, that are capable of producing that ammunition. Therefore, it can be turned out much more readily than any other kind.

Mr. SMITH. What is the difference between the ammunition that is used for the automatic gun and the ammunition that is used for the latest pattern of army rifle?

General CROZIER. Just at present the automatic guns have not been changed to use the rifle ammunition of the latest adopted pattern, although they could use it without being changed over, but in another year we will have them so they will use the same ammunition.

Mr. GILLET. What do you mean by saying that it can be used now?

General CROZIER. We have recently made a change in the ammunition resulting from the adoption of a new bullet. Now, that bullet has a longer and sharper point than the one we are just discarding. The consequence is that the bullet does not attain its full diameter until some little distance, about a quarter of an inch, farther back from the point than the blunter bullet. Therefore, when this car-

tridge is put into the gun the bullet does not come to a seat, to a bearing, at once until it moves forward a quarter of an inch. On account of that it is not quite as accurate. The difference is very small, but it is noticeable at a thousand yards range.

Mr. GILLETT. How will you prevent that?

General CROZIER. Unscrew the barrel, take off a quarter of an inch from the rear end and screw it back. You can use it with the disadvantage of the little difference in accuracy without the change, that is you can use the new ammunition in the old gun.

Mr. GILLETT. But you have to cut off the gun?

General CROZIER. Cut off the barrel of each gun and screw it back into the receiver again.

Mr. SMITH. About how much of this estimate is for automatic guns and how much for mountain, field, and siege guns?

General CROZIER. For the automatic machine guns \$23,280 is estimated and the rest of it is for mountain, field, and siege ammunition, except certain small sums which go to the cost of inspection and such accessory expenses as that.

Mr. SMITH. Is the ammunition the same for the mountain and field guns?

General CROZIER. They will use the same projectile. But we have enough mountain guns, some of which we bought abroad and some of which we made in this country. The gun is not entirely modern, but it is not so far behind as some of the other material, and so up to the present time we have not been replacing it with guns using the same projectile as the field gun. We have a design for replacing this gun. The new one will use the same projectile as the field gun, but will fire a much smaller charge of powder. The metallic cartridges cases will therefore be different.

Mr. GRAFF. The word "ammunition" here means powder?

General CROZIER. Yes, sir, among other things.

Mr. SMITH. You spoke about the charge of powder, but now we simply use cases?

General CROZIER. Yes, sir; metallic cartridge cases.

Mr. SMITH. There is no powder handled in firing these guns directly?

General CROZIER. No, sir.

PURCHASE, MANUFACTURE, AND TEST OF SEACOAST CANNON FOR COAST DEFENSE.

Mr. SMITH. The next item is, "For the purchase, manufacture, and test of seacoast cannon for coast defense, including their carriages, sights, implements, equipments, and the machinery necessary for their manufacture at the arsenals," and you ask for \$2,680,000 this year. Why does this rise occur in the estimates?

General CROZIER. Because this sum is estimated to procure armament for the completion of the defenses of Boston harbor, the eastern entrance to Long Island Sound, Chesapeake Bay, and Puget Sound. Major Hoffer suggests that it only includes the completion of the work at Boston, in accordance with the Taft Board.

Mr. SMITH. How much would be required for Puget Sound?

General CROZIER. \$747,900. That does not complete Puget Sound, because the estimate is only for the completion of the work at Boston. To complete Puget Sound there would be required an additional

armament of four 15-pounder guns, seven 6-inch guns, two 12-inch guns, seven 14-inch guns and eight 12-inch mortars. This estimate of \$747,900 would provide for Puget Sound four 15-pounder guns, which completes those, seven 6-inch guns, which completes those, two 12-inch guns, which completes those, three 14-inch guns instead of seven and no twelve inch mortars instead of eight.

Mr. SMITH. What is the object of appropriating for these guns without any appropriation for emplacements?

General CROZIER. There would not be any, except I think the Engineer Department can build the emplacements in less time than we can build the guns, and if you intend to provide the emplacements afterwards it would be well to give us a start.

Mr. SMITH. I suppose that depends, does it not, entirely on the locality of the emplacements, whether or not they can be built rapidly, and whether they have a sound foundation on dry land to build them.

General CROZIER. Yes, sir; that is decidedly the case.

Mr. SMITH. Is not Puget Sound fairly well fortified now?

General CROZIER. Yes, sir; it is fairly well fortified except in the matter of the heaviest guns. We have at the mouth of the Sound now four 12-inch rifles only, and those are not mounted on the best form of carriage. They are mounted on barbette carriages instead of disappearing carriages. Those carriages are not very good and the rate of fire is much less.

Mr. GILLET. Is Bremerton fortified separately?

General CROZIER. No, sir; there are no fortifications there now. Going back to the amount carried in this estimate for Puget Sound, I have lumped at the end of the whole estimate the inspectors' expenses that always go with the procurement of these things, and they will make the total the same as I have given, being about \$22,400.

Mr. SMITH. Do you contemplate substituting disappearing carriages for barbette carriages?

General CROZIER. No, sir. The barbette carriages are there, and as at other places nobody likes them. They are not as good as the others, but we do not propose to substitute disappearing carriages. The expense of substituting the disappearing carriage for the barbette carriage would be justifiable alone, but it would require very expensive changes in the emplacements.

Mr. SMITH. Have you ever mounted the 16-inch gun?

General CROZIER. Not yet, but we are building a carriage for it. We are producing some 14-inch guns, three of them, and we have the design of the carriage.

Mr. SMITH. Where did you get the money for the three fourteen inch guns; we only gave the money for one?

General CROZIER. That comes from the money for the insular possessions, they are intended for Manila.

Mr. SMITH. You have not equipped any of the 14-inch guns?

General CROZIER. No, sir. The forgings have been completed and the guns should be completed by the end of this calendar year or nearly completed, at the Watervliet Arsenal.

Mr. SMITH. What do you regard as the most emergent of the items at Puget Sound of the additional armament there?

General CROZIER. I would add another element, as well as the emergency element. The most we could get for our money would be

two 12-inch disappearing carriages at \$65,000 each, for which we have the guns already on hand, and the next I would say, would be three 14-inch guns and carriages at \$132,000 each, that is for each gun and carriage. We have neither of those, but we have the 12-inch guns on hand.

MR. SMITH. Are there any of the guns that you have on hand that you plan to erect in the United States for which you have not the carriages except the two 12-inch guns at Puget Sound?

General CROZIER. Yes, sir. In this estimate we are counting on mounting in Boston harbor six 12-inch guns on disappearing carriages for which we have the guns on hand. We have had them for several years. Then we are expecting to mount at the eastern entrance to Long Island Sound four 12-inch guns on disappearing carriages, for which we have the guns on hand.

MR. SMITH. What is your unallotted balance in this appropriation?

General CROZIER. That makes a little longer story than is usually the case. Formerly this appropriation included as one appropriation rapid fire guns and their carriages, as another appropriation seacoast guns and their carriages, it was divided into three appropriations, and there were balances under each which were not expended. The one for rapid fire guns is \$8,603, and for seacoast guns and their carriages \$245, and the appropriation in the form it is this year made includes all kinds of seacoast guns and carriages, whether rapid fire guns or not, that distinction having rather disappeared, and has an unallotted balance of \$165,342.13. Now, \$80,000 of that balance is intended to go for a 14-inch disappearing carriage for which the order is just about to be placed, the design is finished; \$10,000 for tools and fixtures—you will find I alluded to that in last year's hearings—\$2,500 for improved sights for fifteen pounders and carriages which carriages are under manufacture now and \$23,400 for 15-pound rapid fire guns which are now under manufacture.

MR. FITZGERALD. Do you call that unallotted?

General CROZIER. We have not yet transferred the money for that on our books and have not called on the Treasury for it.

MR. FITZGERALD. My understanding of unallotted money is money absolutely free.

MR. SMITH. It may not be absolutely free, the Treasury balance is all that has not been paid out. If they were drawing plans for an \$80,000 carriage for this new 14-inch gun which was given them last year, they would not allot it until they found out how much would be required.

General CROZIER. Yes, sir. The Treasury balance on the 13th of February was \$374,764.85. Of that balance there must be reserved for contracts made \$59,983.35, and there has been allotted to the arsenals for work already ordered, but the money has not been sent to them, \$149,440.37. That leaves a balance which we have not yet formally allotted to the arsenals but will have to pay for material to be manufactured and delivered under contract of \$165,343.

There is an item of legislation under this appropriation to which I would like to call your attention. Under the old method of making appropriations which was more detailed certain balances remained which we find ourselves not in a position to use in the form the appropriation was made. For instance, there is a balance of \$65,656.95 for oil-tempered and annealed steel, for seacoast defense guns of 8-inch, 10-inch, and 12 inch caliber. That process was

inaugurated because of the necessity of ordering the steel in the beginning of the manufacture of the guns because the steel would not be delivered for some time. Therefore, it was not considered necessary to make the appropriation at the same time for the manufacture of the guns. That practice kept up for some time, but a few years ago it was changed.

Mr. SMITH. Why would not that appropriation be available now?

General CROZIER. Because it could only be used for buying steel and it must be steel for 8, 10, and 12 inch caliber guns. We are not making any 8-inch guns and we have 10 and 12 inch guns on hand. What we would use that money for now would be for carriages for some of these guns.

Mr. SMITH. When was the appropriation made?

General CROZIER. It is a balance of appropriations that were made in a series of years. If we were to build any more 8, 10, or 12 inch guns we could use the money.

Mr. SMITH. You could not use it unless you built them yourself?

General CROZIER. We could purchase the steel and deliver it to the contractor and have him make the guns or purchase the steel and make them ourselves.

Mr. GILLET. Are you not making any 12-inch guns?

General CROZIER. No, sir. We have more than we need at the present time and the same is true of the 10-inch guns.

Mr. SMITH. Before we adjourned for lunch you were looking up this appropriation that you asked to have renewed?

General CROZIER. I find that \$65,656.95, the balance of appropriations that had been made for oil-tempered and annealed steel for seacoast defense guns of 8-inch, 10-inch, and 12-inch caliber, is what is left of a series of appropriations that ran from 1888 to 1903, an appropriation being made practically each year. The last one was made on March 3, 1903.

Mr. SMITH. How much was that one?

General CROZIER. \$61,000.

Mr. SMITH. And you never used any part of that appropriation?

General CROZIER. No, sir; and the one before that was \$165,000. Another balance which we have of \$31,230.04 is from a series of appropriations that were made from 1889 to 1903 for finishing and assembling eight and ten inch guns. The last appropriation which was made on March 3, 1903, was \$80,000. We are not either buying any steel forgings or doing any manufacture of 8, 10, 12 inch guns, and therefore those sums of money will not be used, and they may be made available for the purposes of this item which we are now considering, or they may be turned into the Treasury. If they are made available, they may be subtracted from any sums that are appropriated. The estimates which I have made do not rely upon these sums being made available.

Mr. SMITH. Can you prepare an amendment covering that item?

General CROZIER. Yes, sir.

Provided, That the unexpended balances of the \$165,000 appropriated by the act of June 6, 1902, and the \$61,000 appropriated by the act of March 3, 1903, for oil-tempered and annealed steel for seacoast defense guns of 8-inch, 10-inch, and 12-inch caliber, also the unexpended balance of the \$80,000 appropriated by the act of March 3, 1903, for finishing and assembling 8-inch, 10-inch, and 12-inch guns at the Army gun factory, including new firing attachments for guns now in service, and any new tools or machinery necessary for their manufacture, being \$65,656.95 and \$31,230.04, respectively, are hereby made available for the purposes above named.

Mr. SMITH. That language is to immediately follow the appropriation "For the purchase, manufacture, and test of seacoast cannon for coast defense," etc.?

General CROZIER. Yes, sir. It may be remembered that any sums thus made available may be subtracted from the estimates which I have submitted.

Mr. SHERLEY. Have you in hand the totals of those various sums?

General CROZIER. In one case it is the unexpended balance of different appropriations, because the unexpended balance is more than the last appropriation. In the other case, it is the unexpended balance of the last appropriation.

AMMUNITION FOR SEACOAST CANNON.

Mr. SMITH. The next item is, "For the purchase, manufacture, and test of ammunition for seacoast cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture at the arsenals." I see you ask for a million dollars and state that, "This estimate contemplates the completion of the reserve supply of ammunition prescribed by the Taft Board by the year 1916, for all the seacoast armament recommended by that board." That is to say, it will take a million dollars every year to 1916 to complete the reserve ammunition?

General CROZIER. Yes, sir; that is the understanding and expectation. We have on hand about 61 % of the total contemplated reserve of powder, 92 % of the total contemplated reserve of projectiles, and 43.80 %, practically 44 %, of the total contemplated reserve of high explosives for bursting discharges for the projectiles. We are estimating this year for 9.6 % of the powder, which would increase the percentage of powder we have on hand to about 70 % of the total estimate, .29 % of projectiles, which would run that up from 92.3 % to 92.5 %, and 11½ per cent. of the high explosives that would be required. That is consolidated in a table where we do not separate the powder and projectiles, but give simply the value. We have in value 72 % of the estimated intended reserve supply of ammunition.

Mr. SMITH. Is that the two hours' supply?

General CROZIER. That is, the intended reserve is a two hours' supply for half the guns that we have provided for by the appropriations up to and including 1908, the idea being that we will probably not be equally threatened on all coasts at the same time and we can ship the ammunition around. That is a very moderate estimate of the reserve as you see, only a two hours' supply for one-half the guns we have in place.

Mr. FITZGERALD. For the guns now authorized you have only one-half the contemplated reserve?

General CROZIER. The contemplated reserve is a two hours' supply for half the guns, and of that contemplated reserve we have 72 %.

Mr. FITZGERALD. For what percentage of the guns now authorized have you a complete supply?

General CROZIER. That depends on how you figure it.

Mr. FITZGERALD. The figures you gave us are based on the total armament as recommended by the Taft Board?

General CROZIER. The figures I have given you are for the guns provided for by the appropriations that have been made up to and

including the fiscal year 1908. Most of them are mounted, but a few are not. They are not the total estimates of the Taft Board.

Mr. FITZGERALD. Let me read your note: "This estimate contemplates the completion of the reserve supply of ammunition prescribed by the Taft Board by the year 1916, for all the seacoast armament recommended by that board." That will be a million dollars a year for seven years?

General CROZIER. Yes, sir. I understood you to ask me what ammunition we had already provided. We have already procured or will procure by appropriations which have been made, 72% of the ammunition which would be required for all the armament which has been provided for by the appropriations up to and including June 30, 1908. If you want this percentage to apply to all those guns recommended by the Taft Board then this 72% would come down to 60%. We have 60% of the total reserve ammunition contemplated for the total number of guns recommended by the Taft Board.

Mr. SHERLEY. What proportion of this contemplated purchase and manufacture of powder would be purchased and what proportion manufactured by the government?

GOVERNMENT POWDER FACTORY.

General CROZIER. Up to the present time we have manufactured for the Army none of our own powder, but a couple of years ago an appropriation was made for the establishment of a powder factory at Dover, New Jersey, and that factory is just about ready to commence operations. It has commenced already in an experimental way, testing the plant. That plant will have a capacity of a thousand pounds of powder a day of eight hours and if run at that capacity throughout the year, would produce about 300,000 pounds. We use annually in the Army about 300,000 pounds of cannon powder and this estimate we have made here contemplates the procurement by purchase or manufacture of 660,000 pounds, so that if this estimate should be met by an appropriation and we should operate our powder factory to its full capacity we would get about half of the powder by manufacture and half by purchase.

Mr. SHERLEY. I do not suppose you have yet been able to arrive at the cost of manufacture by the government as compared with the cost by purchase?

PRICES OF POWDER.

General CROZIER. Not at the Army factory, but they have done some figuring at the Navy Gun Factory and as a result we have reduced the price we are paying to the private manufacturers altogether from something like 75 cents to 67 cents a pound.

Mr. GRAFF. When was the last reduction made?

General CROZIER. Within the last year, from 69 to 67 cents. We used to pay 70 cents and furnish the alcohol, then the price was reduced to 69 cents and we did not furnish the alcohol, and now it is 67 cents and we still do not furnish the alcohol.

Mr. FITZGERALD. It was charged that the powder could be manufactured for 32 or 33 cents a pound?

General CROZIER. Yes, sir; for about that price by some people who objected to what they called a private monopoly. Figuring was

done by government officers, and a board of which Major Hoffer was a member, finally concluded that 67 cents would be a proper price to pay private manufacturers, and they have accepted that.

Mr. GILLET. How was it during the war—did they put up the price tremendously?

General CROZIER. That is a little hard to say. I think we paid \$1.00 a pound and then the price was reduced to 80 cents.

Mr. GILLET. Did they run the price up at the time of the war?

General CROZIER. That was just about the time of the introduction of smokeless powder. It was an entirely new industry. There was no chance to run the price up because we used very little of it before.

Mr. GRAFF. Is it your intention to run the government factory at its full capacity for half of this powder providing that there is a sufficient appropriation made to permit you to do that?

General CROZIER. As far as an intention has been formed I think so, yes, because I should want to run the government factory at an economical rate, and I do not think that I could run it at less than its full capacity, a thousand pounds a day, and manufacture economically; certain fixed charges would be too great.

While we are on this subject, I would like to say a word or two about the Army powder factory. We have had the subject of the procurement of powder under very careful consideration by a board of Army and Navy officers, which has been thinking about it for a year or more. One of the points which they have taken into consideration has been the deterioration of powder. We hope that it does not deteriorate as we manufacture it now. We have no positive evidence before us that the powder as we manufacture it now deteriorates with time, and we are hunting for that evidence very carefully and have been for a good while.

Mr. SHERLEY. Did the investigation of the accidents on some of the war vessels due to flare backs show that it was caused by the deterioration of the powder?

General CROZIER. That has nothing whatever to do with the deterioration of powder; that is another subject. Old powder is no more subject to that than new powder, but there have been accidents, notably two on foreign vessels which have not been explained on any other theory than the deterioration of the powder. One was the accident to the Japanese battle ship *Mikasa*, which was sunk in a Japanese harbor within a year or two, and the other was with reference to the French battle ship *Jena*, which was blown up in dry dock within a couple of years. There is no direct evidence that the powder in either of those ships had deteriorated, and we have not been able to get any direct evidence that the powder as we make it does deteriorate, but there is a suspicion resulting from those two ships. That has had an effect upon the methods by which we should contemplate the procurement of powder for war purposes; whether we should manufacture it in time of peace in large quantities and store it for time of war, thus, perhaps, keeping it a long time, the time only being shortened by the process of taking the oldest powder for target practice, or whether we should increase the manufacturing capacity and have a less reserve and rely on producing it more rapidly in time of war. That would raise the question of increasing the manufacturing capacity, and as to whether such increase should be in the government's or the private manufacturers' capacity.

Mr. GRAFF. Has there ever been any question about the quality of the smokeless powder that has been made by private enterprise for the government?

General CROZIER. No, sir. It is just as good as we know of. It is subjected to careful inspection. There was an instance a year or two ago of the practice of a fraud in the manufacture by the substitution of faulty samples after it had been selected by the inspectors. This fraud was discovered by the manufacturers and remedial measures were adopted and they discharged the people.

Mr. GILLET. Was it their employees who did it?

General CROZIER. Yes, sir. They found it out and reported it and discharged the employees.

Mr. FITZGERALD. Speaking of the accidents to the two ships, I recollect reading a statement that because of defects in the quality of powder supplied to this government that some of the accidents we have had resulted from that?

General CROZIER. No, sir. There is no *prima facie* evidence of any such fact as that.

Mr. FITZGERALD. Unless I am mistaken, the statement was made by the same man who first started the agitation which resulted, I think, in the establishment of the powder factory?

General CROZIER. I do not remember that. His allegations were mainly on the subject of extortion which he claimed was practiced by the private manufacturers, and also he based his effort to have large government plants established on this point I am now on, namely, that the powder, no matter how well made, was apt to deteriorate, therefore the manufacturing capacity had better be increased rather than the reserve supply.

Mr. FITZGERALD. When the appropriation was made to establish that factory the amount given was enough to enable the government to erect what was considered a complete unit?

General CROZIER. Yes, sir.

Mr. FITZGERALD. It was at that time stated that after we had been in operation so that we could determine whether the government could manufacture it more cheaply, whether it would be advisable to increase the capacity. Have you gone sufficiently far to tell the Committee whether it would be advisable to increase the capacity of the plant?

General CROZIER. Not in the way of determining by actual experience what the cost of manufacture will be as compared to what we pay.

INCREASED CAPACITY OF POWDER FACTORY.

However, my own officers up there have concluded that we could advantageously expand the factory, and the board of Army and Navy officers which considered the subject of the supply of powder have strongly recommended an appropriation of \$300,000 to increase the capacity of the factory. The officer in command of the factory, at my direction, submitted an estimate of \$175,000 which would treble the capacity, making 3,000 pounds a day instead of 1,000 pounds a day. The appropriation which has been made for the erection of the factory and under which the factory has been practically completed with a thousand pounds a day capacity, was \$165,000. Looking at the subject as carefully as I can, I favor the appropriation of \$175,000

to make the capacity 3,000 pounds a day. I do not feel inclined at present to advocate an appropriation of \$300,000.

Mr. SHERLEY. 3,000 pounds a day capacity would be sufficient then to supply all the powder contemplated by this million dollar estimate?

General CROZIER. Yes, sir. In that case, unless I were directed to do so, I would not operate the powder factory at its full capacity, but I would keep a part of it in reserve in deference to the view that we had better make the reserve of powder not quite so large and the manufacturing capacity a little greater. I know of no way to keep reserve plants in the hands of private manufacturers in existence. They either have to operate their plant or it has to go out of existence and the capital has to go into something else. You can only have a reserve plant for emergency kept by the government.

Mr. SHERLEY. Your idea would be to manufacture only a part of the powder appropriated for and purchase the rest?

General CROZIER. Yes, sir; because I do not wish to drive out of existence manufacturers who have always supplied us with good powder.

Mr. SHERLEY. How much trade do they have from private individuals?

General CROZIER. A large amount of trade.

Mr. SHERLEY. Would not that be sufficient to maintain the plants?

General CROZIER. They do not supply any cannon powder to any individual, only to the government.

Mr. SHERLEY. That is a different kind of powder?

General CROZIER. Most of the small-arms powder is a nitro glycerin powder. The government, however, has just begun to manufacture a powder that contains no nitroglycerin. The main difference is in the size of the grain.

Mr. GILLET. Is the small-arms powder used by the government the same as that supplied to the public?

General CROZIER. No, sir. Generally speaking we do not use nitroglycerin powder. We have abandoned it because of its erosive effect upon the gun. This powder has no nitroglycerin in it.

Mr. GILLET. In the manufacture of the small-arms powder do they sell the same product of the factory to the public which they sell to the government? In other words, if the government should stop purchasing would this whole manufacture of powder entirely stop?

General CROZIER. Part of the plant is the same. In all kinds of smokeless powder they use a considerable proportion of gun cotton; and that would go on. Of course they use that both for the commercial powder and the government powder. There are two companies, one in Parlin, New Jersey, and one at Santa Cruz, California, who make nothing but cannon powder. They are in the du Pont Company.

Mr. SHERLEY. Is there any competing company?

General CROZIER. There is no competition. Those two companies only make cannon powder. They could add machines to make small-arms powder.

Mr. GILLET. Suppose the government made its own powder and they equipped their plants to make something else, in case of war could they turn around again and supply us?

General CROZIER. That would necessitate their having on hand certain machines.

Mr. GILLET. Different machines?

General CROZIER. Yes, sir; granulating machines and those machines are not quickly made.

Mr. GRAFF. Has any recommendation been made in an official way for the enlargement of the Dover powder plant?

General CROZIER. There has not, and that is, perhaps, my fault. For one thing, I wanted to get a little further along and wanted to be able to say whether we could complete the plant on a thousand pound a day basis with the appropriation made. Some of you gentlemen may remember that it was very strongly stated that we could not build a plant with a capacity of a thousand pounds a day for the \$165,000 appropriated. The people who urged the appropriation for a government powder factory were positive as to that.

Mr. FITZGERALD. We first appropriated \$140,000 and then it was raised?

General CROZIER. The amount was raised in the same bill. We have put up that powder factory and we have it practically completed and we have not exceeded the \$165,000. I was a little uncertain at first. I could not say that it would require more than \$165,000—we never built a powder factory, and so I could not promise absolutely that we could do it, but we have. The roads leading from one building to another are not very good, but you can travel over them. We have just within the last week or two commenced the manufacture of some gun cotton which is the basis for all powder, to see how the machines work and to see whether we can get the right nitration. When I had to submit these estimates last August, which was seven months ago, I did not care to submit an estimate for the enlargement of the factory, but having completed the factory and having reached the stage of operation, I am able to say that I think the powder could be made more cheaply in that way and I think that the reserve plant which we ought to have can be provided for properly by making an appropriation of \$175,000 for increasing the facilities.

Mr. GRAFF. Would not this extra reserve capacity be more economical than it would be to appropriate for reserve powder that is to meet the same demand?

General CROZIER. I would hope that you would do both.

Mr. GRAFF. I do not mean that we should abandon all appropriations, but would it not tend to economy?

General CROZIER. It would.

Mr. GRAFF. To put it another way, would it not relieve you from some fear if the emergency came that you would not be able to meet it in case of war?

General CROZIER. It would be very comfortable indeed. One reason for not relying on the increased capacity is that the powder takes a great while to dry. It would be necessary to have some six months' supply of cannon powder in any case. We could not turn out the powder in less than six months no matter what our manufacturing capacity might be.

Mr. GILLET. It takes six months for the powder to dry?

General CROZIER. Yes, sir.

Mr. GILLET. Is that because the grains are larger?

General CROZIER. Yes, sir; if you evaporate the solvent rapidly the powder is liable to break down. If you are going to leave it

stable and tough, as it should be, and not subject to disintegration, the solvent must be driven out very slowly, the solvent being a mixture of ether and alcohol.

Mr. FITZGERALD. When will you be able to ascertain the exact cost of manufacturing powder at the Government factory?

General CROZIER. By the time I come before the committee next year I should hope to have figures that would be reliable.

Mr. FITZGERALD. You want some time to see how it will operate?

General CROZIER. Yes, sir. It takes some time to start and we may have to alter some part of the machinery which is not just right at first and do work of that kind which obscures the cost.

Mr. SMITH. Have you any idea of the average life of one of these institutions in view of the danger of explosions?

General CROZIER. I can not give you the term of years. The danger of explosion is not now great. In the open this smokeless powder does not explode. The danger that exists with reference to it is the danger of fire, and when an accident happens you have a fierce fire, but not an explosion, and the damage then comes from the destruction of that which the flames can reach.

Mr. SMITH. It is absolutely impossible to tell what is the average cost of the powder unless you know the amount you have to charge off for insurance, although you do not insure?

General CROZIER. Yes, sir. The joint board which fixed the price of the powder to be paid to private manufacturers had the advantage, in arriving at the cost, of the experience at the naval powder factory at Indian Head, and they took into account their experience in losses due to accidents.

Mr. SMITH. The experience at simply one point would not be worth much?

General CROZIER. There is not much data in the way of experience in the country. We have only been using smokeless powder, at least for cannon, about nine years.

Mr. SMITH. In the cheaper forms of black powder and the like you think the peril is much greater to the buildings?

General CROZIER. Yes, sir; those are subject to explosions.

Mr. SHERLEY. The cost of the institution compared to the output is very small?

General CROZIER. Yes, sir.

Mr. SHERLEY. Here is an establishment costing \$165,000, with an output of a thousand pounds per day?

General CROZIER. Yes, sir.

Mr. SHERLEY. That would make the output amount to more than the cost of the whole plant within a year?

General CROZIER. Yes, sir; 300,000 pounds of powder at 67 cents a pound would be about \$200,000. The buildings there are inexpensive buildings. The power plant is a substantial plant. That is not subject to destruction and is far removed from any building which might be damaged by fire.

Mr. GILLET. If the powder caught fire it would not explode, but simply burn up?

General CROZIER. Yes, sir. The roof on the building might go off, but the walls would not go down. The gases generating would lift the roof.

Mr. SMITH. When you say that you could treble the capacity with about the same amount of money you have, of course the power plant would be sufficient for the enlarged plant?

General CROZIER. Yes, sir; but if you enlarge the plant on the \$175,000 basis, then we would have to have some houses and a laboratory. That would also provide for some conveniences which we have not now. Some of the employees ought to live at the place, the chemist and the firemen. The chemist may be called at any time to go down to some nitrate pot which is misbehaving. We have a boiler plant for heating purposes which must be kept up night and day. The \$175,000 would provide quarters for such of the people as it would be necessary to have at the factory. This plant is in a remote place, as a powder plant ought to be, and therefore the employees have to come considerable distances, which creates the necessity of a few of the principal ones living at the place.

PURCHASE, MANUFACTURE, AND TEST OF INSPECTING INSTRUMENTS.

Mr. SMITH. Why do you recommend the omission of the paragraph "for the purchase, manufacture and test of inspecting instruments for the manufacture of cannon, carriages, and ammunition, and for the machinery necessary for their manufacture at the arsenals?"

General CROZIER. The appropriation for inspecting instruments is now included in the appropriation for the things themselves, and moreover when that appropriation was first put in the bill—it has been in the bill a number of years—it included fire-control instruments and range finders which are provided for in another place.

POWDER, RESERVE SUPPLY (AGAIN).

Before we leave the subject of powder I think I ought to say to the Committee that this reserve supply that we are trying to accumulate includes not only the two hours' supply for half the guns installed, but it also includes what we call the target-practice reserve. It is considered, on the outbreak of war, that the seacoast artillery would be augmented both by enlisting the regular organization up to its full strength, and also by putting volunteer or militia organizations into the seacoast forts, going on the assumption that half the seacoast batteries would be manned by the militia and half by the regulars, and we think that they should have a year's target practice right away. A year's target practice for the regulars and one twice as large for the militia—there is where the ratio of two to one comes in—for the volunteers and militia, and therefore that we should have what we call a target practice reserve equal to the allowance for three years for the regular organization, and that is included in the reserve of which I say I have 72 per cent on hand now for the guns that are provided for up to and including the appropriation act for the fiscal year 1908.

PRACTICE AMMUNITION.

Mr. SMITH. The next item is covered by your estimates, but as I remember it, the Chief of Artillery is the one that is chiefly interested in the practice ammunition?

General CROZIER. Yes, sir; that is the responsibility of the Chief of Artillery. We supply it; that is all. He prescribes the distribution

of it and the allowance per company. It is increased from what it was last year because the artillery has been increased.

Mr. SMITH. What is the actual increase in the companies of artillery—not the authorized, but the actual increase?

General CROZIER. The authorized increase was from 126 to 170 companies. How far they have gone, I do not know. I have not increased this estimate in proportion to the increase in the artillery, because it is expected that the greater portion of the increased personnel will be assigned to small guns for which the practice is not so expensive.

ALTERATION AND MAINTENANCE OF MOBILE ARTILLERY.

Mr. SMITH. The next item is, "For the alteration and maintenance of the mobile artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work and the expenses of the mechanics engaged thereon?"

General CROZIER. I ask for \$75,000. Last year I asked for \$75,000 and you gave us \$30,000. I hope that you will increase that this year and give me what I have asked for.

Mr. SMITH. This does not modernize them?

General CROZIER. No; it does not, except that the day after it is made it needs some modernizing as a rule. We have had one or two cases arise. We have to make the wheels heavier. In the effort to get the material as light as possible we made the wheels too light. We also found that one or two other of the elements needed changes, not very expensive, but costing money, and so we have been very hard pushed for money for the maintenance of the mobile artillery and for some repairs and some changes of things we thought needed changes to strengthen them.

Mr. SMITH. There is no depreciation at all in what you have stored?

General CROZIER. No, sir. If we find out in the service that something is not strong enough, we have to change it.

Mr. SMITH. Are there many of these batteries issued to the militia?

General CROZIER. There are 48 either issued or about to be issued. 32 issued and the others under manufacture to be issued as soon as completed.

Mr. SMITH. Those batteries have the new wheels?

General CROZIER. Yes, sir.

Mr. SMITH. How many batteries did you manufacture before you discovered this defect in the wheel?

General CROZIER. We discovered it a year or so ago. Many of these batteries were in the process of manufacture, in all stages of completion at different places, when we made this discovery, and it would be pretty hard to tell to how many of the wheels which had already been manufactured the change applied. That is only one of the things. We did not have to change very many.

Mr. SMITH. That is the only material change since you adopted the gun?

General CROZIER. Yes, sir. We did not throw the old wheels away, but strengthened them, mainly by putting in stronger fellows.

Mr. SMITH. It does seem to me, at first thought, that this depreciation ought to be almost exclusively in the guns in the service, conse-

quently ought to be not based upon how many you can get appropriations for, but upon the reserves.

General CROZIER. That is quite true of the maintenance and repair, but as you see this is alteration and maintenance.

Mr. SMITH. There has been no material alteration but this, and it is now largely completed.

General CROZIER. That is true, I should say altogether completed so far as the wheels are concerned; we will not be called upon any more.

Mr. SMITH. So practically, unless you discover some new defect in this gun, it is maintenance.

General CROZIER. Unless we discover some new improvement.

Mr. SMITH. No gun becomes defective in one sense until there is a better gun.

General CROZIER. We are always improving something about them, changing them so as to make them up to date.

Mr. SMITH. All those modifications have been slight since this new gun came in.

General CROZIER. Very slight. They have been matters of repair.

Mr. GRAFF. How much of the \$30,000 appropriated for 1908 is left unallotted?

General CROZIER. \$14,766, and we still have four months of the year to come.

Mr. GRAFF. Will it probably exhaust it?

General CROZIER. Yes, it will exhaust it; and moreover we have had to coddle that appropriation a great deal. We have used other appropriations to stretch them over that. In some cases, you understand, that the dividing line is not very distinct as between appropriations; for instance, we have an appropriation for ordnance stores and supplies. We can use the manufactured articles to be issued for the maintenance of artillery, and we can sometimes use that, where if we had a fund under this particular appropriation, it would be the one more applicable. We had to strain our other appropriations to the fullest extent that we could in order to get through on this.

Mr. SMITH. As a matter of fact, a few years back perhaps we were more frugal, for instance, in 1904, you had \$8,000; 1905, \$11,000; 1906, nothing; 1907, \$50,000, and 1908, \$30,000, so that in the last two years we have been much more liberal than before.

General CROZIER. There was a period when we were not manufacturing new artillery, and not putting it out in the service.

Mr. SMITH. Since 1904?

General CROZIER. We did not have the gun in the service in 1904. You gave us the money.

Mr. FITZGERALD. You were fixing up the older guns at that time.

General CROZIER. We were not doing much with it, but we were keeping it in the service. In 1904 you gave \$390,000 for the manufacture of these guns.

Mr. SMITH. Commencing with your large appropriation in 1899, \$900,000, we then followed that in 1901 with \$699,000. That money was not practically spent at the time you got the new model?

General CROZIER. It was not.

Mr. SMITH. So that you had that money for the new model in 1902.

General CROZIER. We adopted it then, and then we had to get our drawings out with the latest additions, and we really commenced the manufacture of this modern gun in quantity not until in 1903. About the time we commenced manufacturing in quantity, I had the officer at Sandy Hook, who had been in charge of the experiments and tests which were competitive, come to my office, and stay there during the time the drawings were being prepared for the manufacture of the new artillery. When they were completed he went out to the Rock Island Arsenal and took charge of the manufacture. That was in the winter of 1902 and 1903.

Mr. FITZGERALD. How much of this money are you using to place in condition the 3.2-inch guns that are withdrawn from the troops, and held in reserve?

General CROZIER. We could use some of this money for simply putting them in repair, that is the painting, so that the carriages would not deteriorate; but there is another item which we will come to in a little while, contemplating alteration of those guns into modern artillery, and which I will explain when we get to it. But for the purpose of putting those in condition, painting and so forth, we could use a certain amount of this, but not very much.

Mr. SMITH. There are none of them in actual use at all?

General CROZIER. Not now, no. The militia still has some of them, and the schools and colleges have some of them; but the maintenance and repair of them does not constitute a large item. This \$75,000 is 3 per cent of the value of the artillery of this class that has been provided for by your appropriation.

Mr. SMITH. Now, of the batteries, you have got 93 of them.

General CROZIER. Yes.

Mr. SMITH. Of those batteries how many are in warehouses and the like?

General CROZIER. There are, or will be when they are completed, in warehouses, 21; that is to say, 48 of them will be issued to the militia, 24 to the regular Army, and the rest in store.

Mr. SMITH. This will be about 4 per cent upon those that will be out in the service?

General CROZIER. If it were all for maintenance in repair, that would be a fair statement of the case.

Mr. FITZGERALD. How much of this is it proposed to use for placing the 3.2-inch caliber guns in repair for storing them for reserve supply in time of war?

General CROZIER. That would be but a small amount.

Mr. FITZGERALD. About how much?

General CROZIER. I should think a couple of thousand dollars, and perhaps less than that.

Mr. FITZGERALD. You are going to ask that we appropriate money to alter these guns so that you would not want any money preparatory to storing them?

General CROZIER. That is true, excepting that I am asking for the money to alter them, not very rapidly. If they are all to be altered at once, there would not have to be anything done at all in the way of preserving—but we are not contemplating altering all at once.

Mr. FITZGERALD. Is that the only repair required, just the painting up?

General CROZIER. I think that is all. There would be some little wooden things to be replaced.

Mr. FITZGERALD. If it only requires such limited money to put them in repair, after they have been used all this time, why do you require so much to repair the ones that have not been used at all?

General CROZIER. The new material, that is not stored; that is issued in the service?

Mr. FITZGERALD. Yes.

General CROZIER. It is not a case of repair with them, but a case of alterations and improvements which it is difficult to forecast, and we are all the time making them.

Mr. SMITH. The new gun is much more complicated, is it not, and more apt to get out of order than the old?

General CROZIER. Yes; more of a machine; more gearing, wheels, stuffing boxes, and so forth.

Mr. SMITH. You now have a recoil of about three or four feet, do you not, and does that not complicate it somewhat?

General CROZIER. Upon the carriages, yes; and that induces considerable complication. Speaking of the character of the work which we would do on the 3.2-inch guns, of course any bright parts are coated over with vaseline, that is, the breech mechanism and so forth; and the wood parts are painted. That class of work is done to prevent deterioration, which we would not have to do if we are going to alter the guns at once.

Mr. SMITH. Are you storing up any reserve ammunition for those old type guns at all?

General CROZIER. No; not now. We have altered one of the gun carriages for the old 3.2-inch guns, and done it successfully, into what we call a long-recoil carriage. We have been in some doubt as to whether it would be better to alter the 3.2-inch gun also and use it on the altered carriage. It would require a different ammunition from the 3-inch gun, which is our new gun. Or, to build a new 3-inch gun and put it on the altered 3.2-inch carriage, which gun would then use the same ammunition as the new gun, and would be the same gun. We have concluded that the difference in cost of altering the 3.2-inch gun and building a new 3-inch gun to go on the altered carriage would not be sufficient to justify us in keeping the old gun in the service.

Mr. SMITH. If you put this new gun on the new carriage, what will be left?

General CROZIER. It would not be a new carriage. We will not have anything left of the old gun; that would be gone altogether, and we would have the old carriage altered.

Mr. SMITH. What becomes of the carriage when you put the recoil apparatus on?

General CROZIER. The wheels, the axle, and the trail which would be made longer, the elevating mechanism—then there will be left all the limbers, all caissons, all the forges and battery wagons, and with slight changes in the partitions to take the new ammunition; so that we thought we would be able to alter one of those batteries into a modern battery with the same gun on it as our new batteries for about one-third the cost of the new battery.

Mr. SMITH. The saving being chiefly, however, in the accessories.

General CROZIER. Largely of the limbers, caissons, forge and battery wagons, and somewhat in the carriage.

Mr. SMITH. Are these old wheels better than the first new wheels?

General CROZIER. Yes, they are; they are highly satisfactory. Our new wheel is very much like the old one.

Mr. FITZGERALD. That would contemplate throwing aside the old 3.2-inch guns.

General CROZIER. The guns themselves would be thrown aside.

Mr. SMITH. Have you now reserve ammunition enough on hand for those guns?

Major HOFFER. We have a quantity of this ammunition, but it is not modern. The shell now being supplied for mobile artillery is a steel shell, whereas the only shell that we have for the 3.2 inch guns is the old cast iron shell. Moreover, the shrapnel is of old design, for which only a very limited number of fuses are on hand.

Mr. SMITH. I am trying to get at the value of the reserve for these guns.

General CROZIER. We have got on hand now ammunition which we have always used with them.

Mr. SMITH. Can you give the quantity?

General CROZIER. If we alter these guns, as I am going to ask you to do in a later item, we will make new ammunition for them of course, increasing the weight of the projectile to 18 pounds. The old 3.2 inch guns do not use a metallic case cartridge.

Mr. SMITH. How many have we?

General CROZIER. Two hundred and fifty of these guns, and the carriages for them also.

Mr. SHERLEY. I do not quite understand you. A moment ago you said that if we altered these guns then we will have new ammunition made for them, and a while back you spoke of having determined that it would not pay to alter the gun, but that you had better destroy it and simply alter the carriage and have a new gun. Are you speaking of the same gun?

General CROZIER. Speaking of the same gun. We will throw away the old gun and make a new gun, and alter the carriage, and then of course that will require new ammunition.

Mr. SHERLEY. If you throw away the old gun you also throw away the old ammunition.

General CROZIER. Yes.

Mr. SHERLEY. How much of that old ammunition is there now?

Major HOFFER. We have almost the full allowance for these old guns.

General CROZIER. Being enough to fill the chests of the limbers and caissons.

Mr. FITZGERALD. How much is that?

Major HOFFER. Cast-iron shell, 101 rounds per gun; shrapnel, 216 rounds per gun, the total being 317 rounds per gun.

Mr. FITZGERALD. What is the value of it?

Mr. SHERLEY. That is what I want to know; and can you use the old ammunition at all if you do not use the old gun; can it be used for anything else?

Major HOFFER. Practically none of it can be used for anything else. We would use the powder in the new mobile artillery guns.

Mr. FITZGERALD. What is the value of the old ammunition you have now which would be discarded?

Mr. SMITH. I think the powder is a comparatively small item, is it not?

General CROZIER. The shells that we used in the 3.2-inch gun were cast-iron shells, not very expensive, and they did not have brass cartridge cases, the powder being in a bag. It would be about eighteen ounces, and that is about 75 cents.

Mr. SMITH. And the projectile is lost?

General CROZIER. That is lost.

Mr. SMITH. How much is that?

General CROZIER. \$1.50 for the cast-iron shell and the shrapnel \$3.50. You wanted to know the money value of the 3.2-inch ammunition that we have on hand. We can get that later.

Mr. SMITH. 25 or 30 per cent of it is in the powder, is it not?

General CROZIER. Possibly, yes. We can give you that.

Mr. SMITH. Suppose you substituted a new gun, remodeled the carriage, renovated the limber and caisson, and the like of that, in what way then will one of those remodeled batteries be less valuable than one of the new ones?

General CROZIER. It would be slightly heavier and not quite so mobile. The remodeled carriage will weigh a little more than a new carriage for the same gun, and the limbers and caissons and forges and battery wagons will be made largely of wood instead of almost entirely of steel, and therefore they will not last so long.

Mr. SMITH. I was speaking of the mere effectiveness in time of war. Outside of the weight there would be no difference, would there?

General CROZIER. It would be the same gun, using the same projectile for the same distance.

Mr. SMITH. And you would have about 60 batteries?

General CROZIER. That is my best recollection. We could in this way get about 60 batteries of four guns each, which would be about 240 guns.

Mr. SMITH. This is the particular question I want to put to you: If we are engaged now in an effort to get a fair degree of efficiency, would it, in your judgment, pay us to divide the money that we decide to give you for the two purposes, and be more liberal on the remodeling of these old guns, and less liberal on the new guns? Would not that more speedily give us a fairly effective defense?

General CROZIER. It would as far as the money is concerned, but I don't know that we would save much in time.

Mr. SMITH. Suppose this committee should decide that they would give you a certain amount of money for the purpose of increasing the reserve mobile artillery, and give you a liberal amount for remodeling the old gun, and the less liberal amount for the new gun. Would that result in substantially the same time in a greater increase of available mobile artillery?

General CROZIER. Yes, it would. All of this applies of course, as you understand, to the field guns, proper. Now we are very short on the next grade of gun, namely the siege guns. We are much shorter on that than we are on the field gun, although we have not nearly as many of those as we need, the 3-inch guns. We contemplate spending the larger part of the \$800,000 for manufacturing heavy field and siege artillery, of which we have practically none of modern type, and can not get any by alteration.

Mr. SMITH. How much of that estimate was for what might be called siege or heavy field guns, and how much for ordinary field guns, in money?

General CROZIER. All of the \$800,000 asked for except \$156,000 was intended for these heavy field and siege guns, excepting some \$57,000 that was intended for extra caissons for militia batteries which had been constructed, and for inspection and tools.

Mr. SMITH. If I figure that right you have \$587,000 there for heavy guns?

General CROZIER. That is right, for this heavier mobile artillery.

Mr. SMITH. It has been suggested to me, General, by some members of the Committee that they would like to know a little more definitely what the special function is of what you call a siege gun as distinguished from a field gun.

General CROZIER. The line between the field and siege artillery is a not hard and fast line, but we have concluded that we would call field artillery the three-inch field gun which we have done most of the talking about; the 3.8-inch field gun firing a projectile weighing thirty pounds instead of fifteen; also 3.8-inch field howitzer of equal mobility with the 3-inch field gun but firing a projectile twice as heavy; the 4.7-inch field howitzer of the same mobility of the 3.8 field gun, and firing a projectile weighing sixty pounds. Those we have regarded as field artillery.

Mr. SMITH. Are the siege guns of the weight necessary for actual sieges?

General CROZIER. They are of the weight necessary for attacking places where there has been considerable time available for placing them in a defensive state. The two pieces which we contemplate here are the 4.7-inch guns firing a projectile weighing 60 pounds with a comparatively high velocity; the 6-inch howitzer firing a projectile of 120 pounds with much less velocity. Those are the two which would be used in an attack on a fortified place, or a place where there had been considerable length of time available for putting them in a defensive state. Now as the probability of their use is not as great as of the lighter artillery, and as we would not expect to use anything like the number of them that we would of the lighter artillery. We propose to get but fifteen batteries each of the siege pieces.

Mr. FITZGERALD. Is the difference chiefly in the mobility of the gun?

General CROZIER. In their power also. The 3-inch field gun fires a projectile of fifteen pounds. The 4.7-inch gun fires a projectile of 60 pounds with the same velocity. The 3.8 field howitzer, which is of the same mobility as the 3-inch gun, fires a projectile of a low velocity. The 6-inch field howitzer, of the same mobility of the 4.7-inch siege gun fires a projectile with the same velocity as the 3.8-inch gun, although the 6-inch gun fires a projectile of 120 pounds.

Mr. SMITH. How much of the appropriation have we spent for siege artillery?

General CROZIER. Very little excepting for experimental purposes. We have under manufacture now, however, heavy field and siege material to the value of about \$560,000—3.8-inch field guns, 4.7 field howitzers, and 4.7-inch siege rifles.

Mr. SMITH. You say that you propose to have fifteen batteries of each of these types?

General CROZIER. The first two estimates that I gave you were for field material. The last one for 4.7-inch siege rifles was the only one of the siege class, and for that we have spent about \$270,000. That is the only one I have mentioned in the siege class proper.

Mr. SMITH. I thought you said that you expected to have about fifteen batteries of each of these heavy classes?

General CROZIER. About fifteen classes of the two classes of pieces forming the siege artillery, namely, the 4.7-inch gun and the 6-inch siege howitzer.

Mr. SHERLEY. How many batteries of light artillery?

General CROZIER. Two hundred and fifty.

Mr. SHERLEY. I was trying to get the proportions.

Mr. SMITH. What would be the total cost of the proposed equipment of heavy and siege artillery—anything above the standard field gun. What I am trying to get at is what rate you are trying to progress on that branch of the service.

General CROZIER. All included in the field artillery of which I spoke to you about, two hundred and fifty batteries, both the standard field guns and the heavy guns.

Mr. SMITH. But you have told us that you have \$560,000 already in the heavy field guns, and in the regular siege equipment, and you are now asking for \$587,000 more for those purposes, if I understand you.

General CROZIER. Yes.

Mr. SMITH. I am trying to find out, assuming that we give you all you ask, how far we will have advanced in the equipment of the army with that type of material.

General CROZIER. We have provided for in appropriations, already made, fifty-three per cent of the standard field guns required; five per cent of the next heavier field guns; none of the light field howitzers; seven per cent of the next heavier field howitzers, which are of 4.7-inch caliber; fourteen per cent of siege rifles, 4.7-inch caliber, and seven per cent of the siege howitzers of 6-inch caliber. Those are the percentages which we will arrive at from money which is already available. If you give us our estimate of \$800,000 for this year, we shall be able to procure material which will change these percentages as follows: 3-inch field material 54½ per cent, 3.8-inch field guns 15 per cent, 3.8-inch field howitzers 15 per cent, 4.7-inch field howitzers 14 per cent, 4.7 inch siege rifles 14 per cent, and 6-inch siege howitzers 14 per cent.

Mr. SHERLEY. Have you a table which would show what would constitute the one hundred per cent of each of the particular classes of field artillery?

General CROZIER. One hundred per cent would be 175 batteries of 3-inch rifles of four guns each; forty batteries of 3.8-inch four guns each—they are all four guns each. Twenty batteries of 3.8-inch field howitzers; fifteen batteries of 4.7-inch field howitzers. Those compose the field artillery of which we contemplate two hundred and fifty batteries. Under the siege material we contemplate fifteen batteries of 4.7-inch siege rifles and fifteen batteries of 6-inch howitzers.

Mr. FITZGERALD. Did you say you had one battery of 4.7-inch siege rifles?

General CROZIER. We have under manufacture two batteries, and the first one is nearly completed.

Mr. FITZGERALD. How much will they cost per battery?

General CROZIER. \$135,000 and a little over per battery of four guns.

Mr. FITZGERALD. When do you expect to get those batteries completed, not at the rate we appropriate, but at the rate you ask us?

General CROZIER. Twenty-four years, it will be, from the present time at the rate we have asked for here.

Mr. FITZGERALD. Are you stretching it over that period on the theory that you will not need them, or hope for improvements?

General CROZIER. If we are going to get them as early as that I will have to accelerate the rate the Committee has been going in recent years.

Mr. SMITH. The next item is the practice item and is also a matter that we have chiefly to settle with the chief of artillery.

PURCHASE, MANUFACTURE AND TEST OF ARTILLERY.

For the purchase, manufacture and test of ammunition, subcaliber tubes, and other accessories for mountain, field and siege artillery practice, including the machinery necessary for their manufacture at the arsenals. You have asked for something greater than you had last year, \$120,000 as compared with \$77,000.

General CROZIER. The reason for that is because of the increased strength of the field artillery.

Mr. SMITH. That is not the only reason, is it?

General CROZIER. We have increased the field artillery.

Mr. SMITH. An increase of thirty per cent in the field artillery and about seventy per cent in the estimate.

General CROZIER. Twenty per cent in the field artillery. You will notice, Mr. Chairman, that the increase from thirty to thirty-six batteries is an increase of twenty per cent. Last year I estimated \$100,000. This year I am estimating \$120,000 which is a twenty per cent increase. The appropriation did not quite accord with the estimate, and I was not responsible for that.

Mr. SMITH. Of course the mere question of how much practice is required is not a question of artillery strength, and all you care to do is to furnish what may be necessary for their practice.

ARTILLERY FOR EDUCATIONAL INSTITUTIONS.

General CROZIER. There is another point about that that I would like to call to the attention of the Committee. We, as you know, provide some military material for certain educational institutions at which there is detailed an officer of the army under provisions of the law. We have been in the habit ever since I can remember of allowing these people to have some ammunition for target practice, both small arms ammunition and ammunition for artillery, but there is really no authority of law for it. When we give anything to these people, we require them to give bond in double the value of the property for the safe keeping and return of property upon demand, which is not applicable to the ammunition that has been fired away in target practice. So in order to bring this practically under the law, I would require authorization, and present it to you now and ask for the authorization. If it is not given of course I shall have to

cease the practice. And with that idea, I would suggest that you change the language of this appropriation so that it shall read "for the purchase, manufacture and test of ammunition, subcaliber tubes, and other accessories for mountain, field and siege artillery practice, and the instruction of students at the institutions to which we issue the artillery authorized, including the machinery necessary for their manufacture at the arsenals." We have in the hands of private institutions of learning about seventy-six pieces of artillery. The target practice allows for the regular service about \$500 a gun per year. I think one fifth of that would be plenty for these civilian institutions, and I do not think that that would be more than that.

Mr. SMITH. You furnish officers to a great many institutions; do you furnish these field guns to strictly civilian institutions, colleges?

General CROZIER. Yes, where they have military instruction, an officer of the army detailed, and a military organization.

Mr. SMITH. Do you regard that as desirable, General?

General CROZIER. The subject has received some attention from the War Department recently, and inspections have been made of these schools; and based upon the reports of the inspecting officers a number of them which have heretofore had this artillery issued to them have been excluded from the ones to which it has been issued; and it is only to those which are capable and willing to make an extra effort that the artillery is now allowed. It is more expensive for them to maintain an artillery organization than an infantry organization. It is not all of them that can maintain the artillery organization.

Mr. FITZGERALD. What are the types?

General CROZIER. 3.2 inch guns are the only ones that amount to anything.

Mr. FITZGERALD. Do you think that the average student of 17 to 19 years is qualified to be instructed in the handling of artillery pieces of that size?

General CROZIER. At West Point they commence with the fourth class, who run down in age to seventeen years. The artillery drill commences the first year of service at the Academy.

Mr. FITZGERALD. The whole atmosphere at West Point is different, and the instruction is along lines that would run to that equipment, but take the ordinary educational institution.

General CROZIER. The ordinary educational institution I should say could not have these pieces with any profit at all, and justifying the expense and the care of them.

Mr. SMITH. Why not appropriate, and limit this law, providing for granting the artillery only to distinctly military schools?

General CROZIER. That is what is done in practice by the War Department.

Mr. SMITH. Have you a list of the schools?

General CROZIER. No, I have not a list of the individual schools, but I can name some of them, the Culver Military School of Indiana—

Mr. SMITH. How can you have that great number out that you spoke of in exclusively military schools? How many guns have you to each school?

General CROZIER. Not often more than two. There are out at the schools now, forty-four 3.2 inch field guns; four 3.6 inch field guns, which are guns of the same class only a little heavier. Twenty-two 3 inch muzzle loading guns, which are absolutely no good and ought

not to count; which ought to be brought in and which I am bringing in. There is always tremendous resistance to an effort to get these guns away from the school.

Mr. FITZGERALD. It would only be a waste of money to let them practice with those guns.

General CROZIER. I would not think of it. Then two 3 inch mountain guns, and four 1.65 mountain guns—

Mr. SMITH. Will you please give us a list of the schools that have this artillery?

General CROZIER. Yes.

Mr. GRAFF. And the character and number of guns of each size.

Name of college and location.	Authority for issue.	Hotchkiss mountain guns, caliber, 1.65-inch.	Hotchkiss mountain guns, caliber, 3-inch.	3-inch M. L. rifle.	3.2-inch field guns.	3.6-inch field guns.
Western Military Academy, Upper Alton, Ill.	Section 1225, R. S. as amended.	4				
Norwich University, Northfield, Vt.	do.		2			
Kemper Military School, Boonville, Mo.	do.					2
Northwestern Military Academy, Highland Park, Ill.	do.					2
Virginia Military Institute, Lexington, Va.	do.				2	
New York Military Academy, Cornwall-on-Hudson, N. Y.	do.				2	
University of Georgia, Athens, Ga.	do.				2	
University of Minnesota, Minneapolis, Minn.	do.				2	
St. John's Military School, Manlius, N. Y.	do.				2	
Michigan Military Academy, Orchard Lake, Mich.	do.				4	
Western Military Academy, Upper Alton, Ill.	do.				2	
University of Illinois, Champaign, Ill.	do.				2	
Pennsylvania Military College, Chester, Pa.	do.				2	
University of Wyoming, Laramie, Wyo.	do.				2	
North Georgia Agricultural College, Dahlonega, Ga.	do.				2	
University of Wisconsin, Madison, Wis.	do.				2	
Miami Military Institute, Germantown, Ohio.	do.				2	
New Mexico Military Institute, Roswell, N. Mex.	do.				2	
Culver Military Academy, Culver, Ind.	do.				4	
Columbia Military Academy, Columbia, Tenn.	do.				2	
Georgia Military College, Milledgeville, Ga.	do.				2	
St. John's Military Academy, Delaware, Wis.	do.				2	
College of St. Thomas, St. Paul, Minn.	do.				2	
Mount Tamalpais Military Academy, San Rafael, Cal.	do.				2	
Wilberforce University, Wilberforce, Ohio.	do.			2		
R. I. Agriculture and Mechanical College, Kingston, Ohio.	do.			2		
University of South Dakota, Vermillion, S. Dak.	do.			2		
Virginia Polytechnic Institute, Blacksburg, Va.	do.			2		
South Carolina Military Institute, Charleston, S. C.	do.			2		
Ohio Northern University, Ada, Ohio.	do.			2		
South Dakota Agricultural College, Brookings, S. Dak.	do.			2		
Kansas State Agricultural College, Manhattan, Kans.	do.			2		
Pennsylvania State College, State College, Pa.	do.			2		
Grove City College, Grove City, Pa.	do.			2		
Ohio Wesleyan University, Delaware, Ohio.	do.			2		
Total		4	2	22	44	4

General CROZIER. I call your attention to the fact that putting this language in will convey authorization and granting the use of ammunition for these purposes, but it will not involve the expenditure of any money, really excepting such as would be represented by the value of the powder that would be fired away with the 3.2-inch guns, because it is ammunition for the 3.2-inch gun which has gone out of the regular service and out of the hands of the militia.

Mr. GRAFF. In practicing with those guns do they use ammunition with projectiles or blank ammunition?

General CROZIER. They use blank ammunition usually. I would expect some of them to use ammunition with a projectile by going to a proper place to do it.

Mr. FITZGERALD. Can not they get just as much instruction without any ammunition?

General CROZIER. No, they could not get as much, although it might be that a good many would never use the projectile because they can not get the ranges; but they do not get as much as they would if they took the trouble to go to the ranges. But even for blank ammunition I would have to have the authority.

Mr. FITZGERALD. What I was trying to find out was the value of these to the institution. If they drill with these guns and merely use blank ammunition, what particular benefit comes from the firing of just blank cartridges out of the guns. The only object in using ammunition would be to see whether they could fire accurately.

General CROZIER. Yes, and get the practice.

Mr. FITZGERALD. But you cannot get that from blank ammunition.

General CROZIER. No, but they could learn the care that is necessary in handling powder in order to insure safety; that could be impressed upon them. Of course they would go into this with a little more spirit if they used projectiles than by simply using blank ammunition.

Mr. FITZGERALD. You say \$100 per gun?

General CROZIER. I think perhaps that is very liberal; and I doubt if it would be found desirable to use as much as that. I did not scrutinize that figure, because it refers only to this old class of ammunition that we are getting through with anyway. With the blank ammunition we would use mostly black powder.

Mr. FITZGERALD. You are somewhat familiar with the complaints coming from people residing in the vicinity of certain companies practicing with field and other artillery. I suppose some of these institutions which you have mentioned would pick out a place to go and practice.

General CROZIER. Of course they are subject to the local laws, and they would have to satisfy the authorities of the locality. Sometimes they drill with friction primers only, which make a little noise and add to the interest.

Mr. FITZGERALD. They have heavy artillery in Brooklyn, and my impression is that that regiment was drilled for a considerable time with dummy guns, and at certain periods got permission, in their maneuvers, to go into the forts to practice.

General CROZIER. That is the 13th?

Mr. FITZGERALD. Yes, and I think eleven hundred was their strength. It occurs to me that if they could get beneficial instruction out of wooden guns, why would not these educational institu-

tions be able to get all the instruction they want from the drilling by the use of such guns without the use of ammunition?

General CROZIER. The militiamen that you speak of did not have their instruction combined with the dummy gun. They all went into the regular batteries down at Fort Hamilton and at Fort Wadsworth.

Mr. FITZGERALD. I think that they were instructed throughout the year in their drills in the army by the use of these dummy guns.

General CROZIER. That is what these students would have; their instruction during the year would consist in drilling with this gun without firing anything, and then at certain times, and for a short time, they would use some ammunition, blank ammunition, if they could not get where there is a range. But they could use ammunition with projectiles if they could get the range. I do not anticipate that there will be very much of that, however, nor very much of the ammunition used. But, if you think of this for a moment, Congress authorized a lot of officers to be used at these educational institutions for purposes of instruction. It authorizes the use of muskets, and this artillery and equipment, amounting to a considerable money value, free of charge to the institutions. Now, if the instruction under these officers at these institutions can be improved considerably and the interest can be improved—because that is a point they have to contend against, for faculties are very likely not to be in love with the military members of their own institution, and it is apt to be implied on the part of the military instructor that he should give enough military instruction to justify his presence there. Indirectly, in the matter of expense, this amounts to an increase, in this artillery, for material, most of which we would not otherwise use, and it would not be sacrificing a great deal, and it might add considerable to the efficiency of those institutions.

Mr. FITZGERALD. As to these men in fortifications, do they drill without firing anything?

General CROZIER. Oh, but they all know that the firing is ahead of them, and that produces an effect on every drill that they have.

I might suggest that if it would make you look any more kindly on that item, that you might put in there a limit of the amount.

Mr. SMITH. Personally I would favor a limit being in there on all excepting the strictly military schools. I am opposed to allowing artillery to anything excepting strictly military schools. I believe in infantry drills in schools, but not artillery training in anything excepting the strictly military schools.

General CROZIER. I agree with that entirely, and I would be perfectly content to have that put in there for strictly military schools. We have a form descriptive of that class of schools which could be inserted.

Mr. SMITH. You can insert that in your notes at this point.

General CROZIER. And I would be perfectly willing to have a limited sum.

Mr. GRAFF. You will suggest the limit?

General CROZIER. Yes.

ALTERATION AND MAINTENANCE OF THE SEACOAST ARTILLERY.

Mr. SMITH. Now we come to the item for the alteration and maintenance of seacoast artillery. Before proceeding to the considera-

tion of the amount, you have added the language here: "Civilian and enlisted."

General CROZIER. That language covers the extra pay of the enlisted men, and is the language with regard to the civilian mechanics also.

Mr. SMITH. The introduction of those words does not have any particular effect.

General CROZIER. No, because the appropriation has always been applicable to that anyway. That means the pay for machinists that are used in perfecting these alterations. The word "mechanics" was there before, but we did not have the words "civilian and enlisted" before it. The object of the change and the only effect of the change is to enable us to pay extra duty pay to enlisted men who are engaged in this work. There is in each artillery district, that is, at a place like the southern entrance of New York Harbor, for instance, where there are several posts, usually at the largest and the most important one, a small shop, perhaps about the size of this room, where there are a few simple machines which can be used in making repairs of armament. There is employed there by the Ordnance Department in each one of these districts a machinist for the purpose of making these repairs for that group of posts. Once in a while we send machinists there in addition to the one employed there, to do some extensive work that requires more than one machinist. Usually at these posts, or district headquarters, both for the resident machinist and for the occasional machinists who go there, there are detailed soldiers as helpers to do the work of the ordinary helper in the machine shop and save employing a helper. The work which they do is constant; that is to say, they work eight hours a day with the machinists, we working the machinists for that length of time. So as to get the value of his time he is employed for eight hours—is expected to work eight hours a day and does. Soldiers as a rule do not work eight hours a day. He drills, then it is something else, then he goes to his gymnastic exercises, then he does something else, so that he is not an eight-hour a day workman. These soldiers that go into these shops have steady employment at pretty hard work which is not considered a part of their daily life as a rule. When they do this class of work in other departments, the Quartermaster's Department, and other departments, they pay what they call extra duty pay, which runs from 25 to 50 cents a day, although a man has to be something like an overseer of labor to get 50 cents, and the usual rate is 35 cents. We cannot pay these men because we have no appropriation that is applicable to it, and this is to make this appropriation available for that kind of work.

Mr. SMITH. Wouldn't this language be better, to insert the word "compensation?"

General CROZIER. Perfectly well satisfied to have the word "compensation" exchanged for "expenses." The word "expenses" was there because formerly it was simply for the mechanics engaged thereon. When we send these men traveling about we have to pay their expenses, and pay their railroad fare as well.

Mr. SMITH. But do you not pay the mechanics out of a line which precedes that "for the alteration and maintenance of the seacoast artillery, including the purchase and manufacture of machinery,

tools and materials necessary for the work"—isn't that what you pay their compensation out of?

General CROZIER. Yes, sir.

Mr. SMITH. Was not this last clause in here, that you are trying to modify, simply the clause to enable you to pay the expenses of the mechanics as distinguished from compensation?

General CROZIER. I think the clause was rather a descriptive clause. I do not need it to pay the expenses, and I put those words in there merely to describe one of the ways in which the money was expended.

I notice here that the language is not printed in the bill exactly in the way I thought it was. I had not noticed it before. What I propose and what I suggest now is, "the expenses of civilian mechanics and extra-duty pay of enlisted men engaged thereon."

Mr. GILLET. You do not need civilians?

General CROZIER. Yes.

Mr. SMITH. He has paid the civilian mechanics, and the extra-duty pay is extra compensation for the enlisted men.

General CROZIER. I want to include both the pay and the expenses of the civilian mechanics, and the extra-duty pay only of the enlisted men.

Mr. SMITH. There are two distinct classes of mechanics that they are providing for; extra-duty pay for enlisted men, mechanics, and enlisted men acting as mechanics.

Mr. FITZGERALD. To what extent are enlisted mechanics engaged in this work?

General CROZIER. There is usually one man, an enlisted man, constantly employed as a helper to the machinist in each one of the Artillery Districts. A district is, for example, Boston harbor; another district is the eastern entrance of New York harbor; another is the southern entrance of New York harbor; another district is the Washington District, down here by Fort Hunt.

Mr. SMITH. My own objection would be to strike out all the old language for the expenses of civilian mechanics and make it read, "necessary for the work and extra-duty pay for the enlisted men engaged thereon."

General CROZIER. I think it would be perfectly well to leave it out, as I do not need it.

Mr. FITZGERALD. Why would it not be better to hire all civilian laborers?

General CROZIER. This appropriation has never been as large as I wanted it to be, and it saves money.

Mr. FITZGERALD. I have not much sympathy with the idea of using enlisted men for mechanics' work.

Mr. SMITH. Artillery officers do not like that kind of thing.

Mr. FITZGERALD. I understand there is considerable complaint from the men themselves.

General CROZIER. These men are working on their weapons.

Mr. FITZGERALD. The trouble about all these things is that they commence in this little bit of a way, and then they grow up to such dimensions that they make trouble all around.

Mr. SHERLEY. Is it not an advantage to have in your company one or two men who have mechanical knowledge and training in regard to their work, and would they not be a distinct aid in time of war?

General CROZIER. They certainly learn about their weapons by having to keep them in repair, and making plugs, and attachments, and so forth.

Mr. SHERLEY. Would it not be of some value to have that knowledge on the part of enlisted men?

General CROZIER. Yes, sir, it would be.

Mr. FITZGERALD. But would it not be more beneficial to employ the mechanic himself from the enlisted men?

General CROZIER. These mechanics are not found among the enlisted men. There is no grade of pay to secure them.

Mr. FITZGERALD. There might be in time.

General CROZIER. These men get \$3 a day, and if such a man were to be found in one of the companies he would probably leave.

Mr. SMITH. Let us proceed to the request for \$150,000 increase on this item.

General CROZIER. Thank you, Mr. Chairman. You will notice that under that clause for alteration and maintenance of the seacoast artillery we have had to do a great deal of repair work on this seacoast artillery, but we have had to do considerable alteration, because it has been modernized greatly. It has been improved a good deal since it has been put into service. You may remember that after a good many years of neglect we jumped rather suddenly into the business of rehabilitating the seacoast defences and building armament for it, so that our skill in designing and building seacoast armament was not the result of a gradual and continuous progression. Therefore, after we got this armament in place, part of it, we found that that which was emplaced afterward was very much better than that which was emplaced at first, and that that which was emplaced still later was very much better still. Up to the present time we have not discarded any of it, or next to none of it, because we have been able to improve that which was put in before; to design improvements and see whether improvements could be made. We have now improvements in sight in the material that has been installed, the guns and gun carriages which have been installed, amounting to \$3,000,000 in cost. If we could go right at it and do it, that would bring it practically all up to the stage of efficiency of about the latest of it. This \$3,000,000 looks like a pretty large item, but the money that has been spent on the armament to which it would be applied is about \$37,000,000, so that the percentage is not very large.

Mr. FITZGERALD. Thirty-seven million dollars or \$17,000,000?

General CROZIER. Your figures in the printed bill give it \$17,000,000 but they are not correct, Mr. Fitzgerald. The true figures would foot up to about \$37,000,000. Now this amount that I have estimated for here, \$550,000, is about one and one-half per cent, as you will see, of the value of what that material cost, and that is a very moderate percentage.

Mr. FITZGERALD. Is that mostly for relining guns or altering carriages?

General CROZIER. It is mostly for altering carriages; in some cases for procuring sights.

Mr. SMITH. There have been a number of changes in the breech apparatus since these were first put in?

General CROZIER. There have been some. I have a whole list of alterations here that are included in the sum which we will be able

to spend if we have it. None of those barbette carriages that I was speaking of a moment ago have any shields on them, to protect the cannoneers against the small-gun fire of the enemy. They ought to have shields on them. They would cost \$10,000 per carriage for the shields alone. I am sorry that the guns are mounted upon those carriages. I did my best to prevent it, but I was not able to.

Mr. GILLETT. Who decided that?

General CROZIER. The Commanding General at the time, and the Secretary of War. The Secretary of War really decided it, but at the strong insistence of the Commanding General of the Army and in the face of just as much opposition as I could bring to bear.

Mr. SMITH. What is your available balance under this item now?

General CROZIER. Four hundred and sixty-nine thousand dollars, which is intended to be used partly as follows: I intend to spend \$145,000 for modernizing some 116 15-pounder carriages by elevating the traversing gear on them instead of elevating them by moving the body, which is not sufficiently delicate, and various other changes which will amount to about \$1,250 per carriage. I intend to strengthen the racers, as we call them, the upper member of the turntable, of 40 mortar carriages which we have altered heretofore. That process has been going on for some time. That will cost about \$72,000 for the material, and then for the labor it will cost about \$149,000. Those two items alone for the 15-pounder carriages and mortar carriages will amount to \$366,000. Then for the maintenance, including the work of mechanics and the material necessary, about \$100,000 will be necessary for the remainder of the fiscal year.

Mr. SMITH. What is your Treasury balance?

General CROZIER. It is \$699,816.23.

Mr. GILLETT. I am afraid I do not understand this. According to this you have not used up your appropriation of year before last.

General CROZIER. That is true. The \$145,000 item which I have here was waiting on the test of these alterations that we were making in these 15-pounder carriages to see that they were all right. Those are not quite completed yet, but very nearly, so that I want to put that \$145,000 worth of work out as soon as possible.

Mr. GRAFF. How long will it take you to expend this \$466,000?

General CROZIER. I suppose it will take me at least a year from the present time to spend it. It will run over into the next fiscal year, six months; perhaps longer. But I want to start it now, and similarly some other work that I wish to do with the \$550,000 that I am asking for now, which will probably take a year to spend.

Mr. GRAFF. But the \$466,000 that you have itemized you have charged against the sum you had unallotted out of that old appropriation?

General CROZIER. Yes. I want to do more work of the same class and other classes, too, out of this \$550,000 that I am asking for.

Mr. FITZGERALD. Will you use all that money in a year?

General CROZIER. No. It will require a good while to do. For instance, the alteration of the mortar carriages requires a couple of fairly large castings for each one, and it takes a considerable time to get them. You have to order a considerable number at one time or the price goes up. Of course if it were a case of emergency we would urge their being delivered more quickly and pay a higher price for them. But it takes a considerable time to spend the money for alterations on a considerable number of this class.

It seems to me the most instructive statement that can be made of the whole matter is \$550,000 is only one and one-half per cent of the value of the material to which it is to be applied for maintenance and improvement. That is a very moderate percentage, considering any machinery that is in ordinary use; no matter how simple it is, it will run up as much as that.

Mr. FITZGERALD. Suppose you consider the percentage that this \$550,000 bears to the value of our guns and carriages upon which it is to be expended. Then it gets very high.

General CROZIER. Then it gets higher, but it will be expended upon all classes of the seacoast material, from the smallest to the largest. It will be expended upon 15-pounder guns and carriages, and upon 4.7-inch guns and carriages, and 5-inch guns and carriages, and 6-inch guns and carriages, and 8-inch guns and carriages, and 10-inch guns and carriages, and 12-inch guns and carriages, and 12-inch mortars. They all have to have expenditures made upon them. Some of them are very early models. Some of these guns that were put in service earliest are mounted on disappearing carriages of the model of 1894. We have made a great many improvements since those carriages were designed, and we would like to bring the older carriages up to date. These older guns are all being counted in the strength of our seacoast fortifications, and justify our refraining from asking for material to replace them—asking for modern guns and carriages to replace them. The guns are of good power, but the alterations that are being proposed are largely for the purpose of increasing the rapidity of fire, and also for the purpose of increasing the accuracy of fire.

Mr. SMITH. Did not the old type of disappearing carriage furnish as accurate a fire as the modern type?

General CROZIER. So far as the carriage is concerned, it did; but the sights have been greatly improved. We have much better telescopes than we had then, and they are attached much more efficiently to the carriages.

Mr. SMITH. You spoke of modernizing the carriages themselves, and I wondered if the old carriages did not make the guns ineffective.

General CROZIER. No. I had in mind the sights, chiefly. Major Hoffer reminds me of another class of material concerned in the accuracy of fire. We attach to these carriages, many of them, what we call range disks, which are very accurately graduated to scale, which enable the guns to be set at a proper elevation with the range that may be sent down from the fire-control station. That is one of the elements of expense that we have to take into account.

Mr. FITZGERALD. How much has been expended in the past year out of this appropriation for the purchase and manufacture of machinery and tools?

General CROZIER. I will have to look over the records for that, Mr. Fitzgerald. I think I can say it is not a large amount, but I will have to look over the records in my office to see.

Mr. SMITH. Mr. Fitzgerald's suggestion is very appropriate. I think it was Col. Hepburn that complained of this language in the last Fortification bill, and in view of that I suggest that you fill in in your hearings how much has been expended out of all these appropriations authorizing expenditures on machinery in connection with your work, so that we may be able to answer.

Mr. FITZGERALD. We could not give any definite information on that occasion, I remember.

General CROZIER. I will give you the figures in regard to each one of these items of appropriation.

Funds allotted for machinery under the appropriations "Armament of Fortifications" and "Fortifications in Insular Possessions" during the fiscal year 1907 and part of 1908.

Subheads.	Amount.	
	Fiscal year 1907.	Fiscal year 1908 (to Feb. 19, 1908).
Armament of Fortifications:		
B.....	\$6,000.00	\$4,258.25
C.....	34,274.48	12,775.00
DFG.....	1,028.00	600.00
H.....	2,136.50	6,700.00
I.....		1,000.00
K.....	300.00	82.50
M.....	8,023.48	1,703.58
22-a.....	350.00	
55-a.....	9,133.61	
Total "Armament of Fortifications".....	61,246.07	27,119.33
Fortifications in Insular Possessions DFG.....	578.27	1,803.40

ALTERATION OF 3.2-INCH MATERIAL.

Mr. SMITH. Now we come to this item for alteration of 3.2 material to rapid-fire field material.

General CROZIER. We have talked about that a good deal already, Mr. Chairman, and I do not know that I can add anything to what I have already said.

Mr. SMITH. I notice you put in the same estimate that you did a year ago. If you adopt the plan of substituting a new gun for an old gun, would not the expense per battery be greater than your formal estimate?

General CROZIER. I had that computed last year. The expense of the alteration of the 3.2 gun to fit it with sliding parts, or guiding parts, so that it can run on a slide provided on the carriage and recoil, and the expense for so altering the breech mechanism that we can use metallic case ammunition, is such that the difference of expense of supplying an entirely new gun would only be a couple of hundred dollars.

Mr. SMITH. So that you still think with \$100,000 you could remodel five batteries?

General CROZIER. I think so; yes.

Mr. SMITH. And a single new battery with the necessary equipment would cost what?

General CROZIER. About \$77,000, so that this is less than one-third. This alteration could be made for less than one-third of the price of the new battery.

Mr. SMITH. About \$20,000 a battery, or \$5,000 per gun?

General CROZIER. Yes, sir.

PROVING GROUND, SANDY HOOK, N. J.

Mr. SMITH. Now all the following items, gentlemen, go out, down to the Proving Ground at Sandy Hook, on page 18. What was the trouble with the old language there, General, that you ask to have modified?

General CROZIER. It did not describe very accurately what the money was expended for, and in addition, it contemplated the division between two appropriations of expenses for transportation, which I did not see any reason for separating.

Mr. SMITH. Did not the old one simply separate the repair of the railroad from the operation of the railroad? In a measure did not the old arrangement do that?

General CROZIER. There was an item, I think, for repairs, and an item for operation too.

Mr. SMITH. That is what I say. There were two separate items. You are considering them now.

General CROZIER. Yes. I am consolidating them both with the water transportation. There was an appropriation for repairs to the railroad tracks.

Mr. FITZGERALD. Do you need \$6,000 to keep that railroad in repair down there, General?

General CROZIER. Well, it is about six miles long, and for some of the damage that is occasionally done to it we have to draw on something else than that \$6,000, because the sea gets at it down near the southern end of the Hook there, and it gives us a great deal of trouble. It did it last winter.

Mr. FITZGERALD. Is there not a breakwater?

General CROZIER. Yes, but this winter the sea has got around the northern end of the breakwater. I have called upon the Engineers to see if from the unexpended balance to construct the breakwater it could be repaired.

Mr. FITZGERALD. It runs on the inside of the Hook, towards the Highlands?

General CROZIER. When it gets down to the Highlands the inside and outside are very close together. It is a very narrow neck there.

Mr. FITZGERALD. What was the boat maintained out of?

General CROZIER. Out of this appropriation. I have simply taken that \$6,000 that has been appropriated yearly for some time for repairs of the railroad track and added to the appropriation that has been made for a number of years, and left out the repairs for the railroad track.

Mr. SMITH. The country is saved \$43. I was afraid to interfere with it when we were beginning.

General CROZIER. It is \$43 less than it was.

Mr. FITZGERALD. That is the suspicious part of it. [Laughter.]

General CROZIER. In the rest of the language there is no great point, only I think that language describes a little better what the money is expended for.

Mr. FITZGERALD. I looked over the railroad when I was down there, and I wondered what you did with \$6,000 in keeping it in repair from year to year.

Mr. SMITH. It has been used up, substantially, has it not, General?

General CROZIER. Yes. It has been used up right along. It is in trouble now. The railroad is temporarily fixed, but if the weather

treats us very badly we will have to call on something else than the \$6,000.

Mr. GRAFF. The rolling stock belongs to some one else?

General CROZIER. The rolling stock belongs to us.

Mr. FITZGERALD. If this is simply for the repair of the tracks, I could not see how you could use this \$6,000 a year on it.

Mr. SHERLEY. How long is it?

General CROZIER. Six miles long.

Mr. FITZGERALD. Yes; but there is only one little part of it that—

Mr. GILLETT. As I remember, at the south end it runs right along the shore, and is liable to wash.

General CROZIER. It gives us a great of trouble at that end. This sum has not been found to be any too much. Of course every once in a while we have to put in a lot of new ties. The ties rot out. That is a source of expense.

Mr. SMITH. Have you a statement here as to how you expended the \$6,000?

General CROZIER. No, sir, I haven't it with me. If I brought all these statements down you would not get them in the room. I can give it to you.

Mr. SMITH. It might be well, as illustrating the expenses, to set forth what the expense for that item was for the last fiscal year.

General CROZIER. During the last fiscal year the entire \$6,000 appropriated was expended for this work.

Mr. FITZGERALD. Do you imagine the railroad would be likely to keep that in repair?

General CROZIER. The Central Railroad of New Jersey, do you mean?

Mr. FITZGERALD. Yes.

General CROZIER. I would like to see them do it for \$6,000. Most of our workmen live down there. We run two passenger trains down there each day.

Mr. SMITH. There is no fare?

General CROZIER. No fare.

Mr. SMITH. That is an ideal Government-owned railroad.

General CROZIER. We have not been able to secure an interchange of passage with any of the authorities of the neighboring railroads, but we carry a good many passengers. All our workmen go up and down there. It is the solution of a dreadful nuisance of keeping up the repairs of the houses, and cellars, and sinks, and so on, which you have to do when you have a community like that. We have them nearly all bundled off down there, and they look out for their own houses.

NECESSARY EXPENSES OF OFFICERS, ETC.

Mr. SMITH. The next item is current law and has been unchanged for many years.

General CROZIER. Yes, sir.

Mr. SMITH. That is for necessary expenses of officers, etc., \$18,700. Is there any material balance of that unexpended?

General CROZIER. I do not know exactly what it is. I do not have it among the balances here.

Mr. FITZGERALD. Is that the money for conducting the house?

General CROZIER. The house is conducted out of that money. I have explained that every once in a while. I will be glad to explain it again.

Mr. FITZGERALD. I was down there one time.

Mr. GILLETT. Then you are part of the expense. [Laughter.]

Mr. FITZGERALD. I was down there at the time they had the graduating class at West Point down there two years ago.

General CROZIER. It is for two purposes that are not very closely related. I have not changed it because it has gone on for so many years. First, for draftsmen in the Ordnance office who are employed for general purposes. It does not pay nearly all the draftsmen I have in the Ordnance office, but there are some of them who are not paid out of the manufacturing appropriations which are made for procuring articles on which they directly work, and those not so paid are paid out of this sum.

Mr. SMITH. And they are not paid out of a separate item?

General CROZIER. No. They are regularly employed year after year, and their salary constitutes an obligation against this item of appropriation.

Now, the other purpose of this item concerns Sandy Hook, and is for the expenses of the officers who are down there and who are constructively away from their station, which is New York City, and who get \$2.50 a day apiece for their expenses, which \$2.50 they do not see; but it goes to the maintenance of that house down there. There is no obligated balance.

Mr. FITZGERALD. It is absolutely necessary to have some place down there where those people can get some accommodations?

General CROZIER. Yes; and we have not quarters for these officers. Four of our officers there, I think, are living in quarters which belong to the artillery post and are, so to speak, borrowed from the Artillery, because they have no artillery officers to occupy them. They have no quarters in New York City, and they take part of their meals at this brick house, and they do not get the \$2.50 a day, but half of it.

Mr. FITZGERALD. Do some of your officers stop at Governor's Island?

General CROZIER. Two of them do. They are away from their stations when they are down at Sandy Hook, and they get \$2.50 a day, which they turn into the brick-house fund; so that, except for the four that have their quarters in the artillery post there, in borrowed houses, the others have no place to live except that house.

Mr. SMITH. The next item is for submarine mines.

General CROZIER. The Chief of Artillery makes that estimate. I simply disburse it.

Mr. SMITH. Therefore you do not care to say anything about it?

General CROZIER. No.

Mr. SMITH. We will call him.

General CROZIER. I simply look after the financial accounts of that, so as to avoid having another auditing bureau in the War Department.

Mr. SMITH. Now, these torpedo planters come to the Quartermaster-General?

General CROZIER. Yes. They are not in my estimates.

WEDNESDAY, *February 19, 1908.*

**STATEMENT OF BRIG. GEN. WILLIAM CROZIER, CHIEF OF ORD-
NANCE, ACCOMPANIED BY MAJ. L. M. FULLER, AND MAJ.
JAY E. HOFFER, ASSISTANTS—Concluded.**

FORT MACON, N. C.

Mr. SMITH. General, before passing to the examination of the items in the Insular possessions, I notice that there has been presented to the Committee this morning a bill introduced by Mr. Thomas, of North Carolina, for the fortification of Fort Macon, North Carolina. Is that a point recommended by the Taft Board?

General CROZIER. No, sir. Wilmington, North Carolina, is the only place the fortification of which is included in the present scheme of fortifications (Taft Board scheme). The only additional one in North Carolina that I know of is at the mouth of Cape Fear River.

Mr. SHERLEY. That is not the name of this particular fort, is it?

General CROZIER. Fort Caswell is at the mouth of Cape Fear River.

CONSTRUCTION OF FIRE-CONTROL STATIONS AND ACCESSORIES.

Mr. SMITH. I think we should have examined you yesterday, General, on page 3 of the bill, on the Ordnance branch of fire control. We did not do so yesterday.

General CROZIER. No, sir. You said nothing about fire control to me yesterday.

Mr. SMITH. We omitted that item there through oversight. Now, General, how much of this estimate of \$1,685,750 would be for the ordnance?

General CROZIER. We did not bring that down.

Mr. SMITH. Have you any detailed statement here, General, of the items for the Ordnance embraced in this general heading?

General CROZIER. I can tell you the class of items.

Mr. SMITH. I think we understand the class of items, but you have not anything in here to indicate how much you want for any one point?

General CROZIER. No, sir. I did not make that estimate. Our prices are given, and the places at which that money is intended to be applied are selected mainly by the Chief of Artillery, and most of the work which would be done with that appropriation will be done by the Engineers and the Signal Corps. We will get certain instruments of the class that you know, the range-finders and instruments of that class, but I have not made an estimate for the particular number of instruments for particular localities.

Mr. SMITH. I think, then, we will pass these other items of fire control, General.

General CROZIER. With reference to this lump sum, Mr. Chairman, you will see from the remarks that in the United States it is intended to complete the fire-control installation at three points. Now at those three points I can tell you how much is required for the Ordnance Department, although I have not the figures here now.

Mr. SMITH. We will call the Chief of Artillery, and I think we will be able to get it all from him.

FORTIFICATIONS IN INSULAR POSSESSIONS (ORDNANCE DEPARTMENT).

Now we will pass directly to the Insular possessions. The first item is on page 25, "For the purchase, manufacture and test of sea-coast cannon." Now why is this provision in here for mounting five 12-inch rifles on carriages?

General CROZIER. Because we have already manufactured the guns which are available for use, but they cannot be used for the Insular possessions without special authority of Congress.

Mr. SMITH. Is this the language which we have usually used for that purpose?

General CROZIER. Last year there was printed in the bill the wrong language, and we did not get the authorization in regard to one of these guns that we wanted. The proviso read last year, in last year's appropriation, "That the Secretary of War is authorized to mount one 12-inch rifle to be procured out of appropriations made or to be made hereunder for the Insular possessions." That proviso means nothing, because of course if the gun is to be procured out of the appropriations that are made or are to be made, he will be authorized to mount it. There has been a printer's mistake or clerical error, and there have been left out, before the words "to be procured," the words "on a carriage," so that it should have read, "That the Secretary of War is authorized to mount one 12-inch rifle on a carriage to be made or procured," etc.; so that these five have to be made here to cover that little error in the printing of the bill last year.

Mr. SMITH. Where do you expect to erect these five guns?

General CROZIER. In the first place, they will be reduced in number from 5 to 3, and the estimate will be reduced from \$3,008,000 to \$2,590,000, because of the abandonment of the project for putting a naval station at Subig Bay. Subig Bay will therefore not be as well fortified as it was expected to be, and there will be a saving in money of something like \$400,000 in the estimate. This estimate will therefore read \$2,590,000, and the proviso relating to 12" guns just referred to should read 3 twelve-inch guns instead of 5.

Mr. SMITH. Where are these three to go?

GUANTANAMO, CUBA.

General CROZIER. I can answer that question, I think, in a little different form, Mr. Chairman: Those three guns are intended to even up, I will say in general, the appropriations that have been made heretofore and the estimates that are now submitted for 12-inch guns and carriages, and these estimates now contemplate using at Guantanamo, Cuba, 6 twelve-inch guns. There is no garrison there, and there is a little armament there, and there is a small naval station there.

Mr. SMITH. A majority of those present the other day voted to take no hearings on Guantanamo.

Mr. FITZGERALD. You had better let us know what you have in here for this.

General CROZIER. Suppose I finish that answer, Mr. Chairman.

Mr. SMITH. Very well.

MANILA, P. I., AND HAWAIIAN ISLANDS.

General CROZIER. For Manila Bay, six 12-inch guns are to go. Now I can perhaps give you a little more general answer to the question you would ask in this way: Of this sum of \$2,590,000 which I am now asking for, it is intended to use \$619,400 at Guantanamo, which will provide for other armament besides the six 12-inch guns which I just spoke of. There is intended to be used for the Hawaiian Islands \$493,400.

PEARL CHANNEL, HAWAII.

Mr. SMITH. Right there, before you pass that, how much of that is for the 12-inch guns to be mounted at Pearl Channel, Hawaii? Can you divide that up for us?

General CROZIER. For the mouth of Pearl Harbor there is intended \$200,000 for mortars and \$14,700 for 15-pounder guns. That is the part of this estimate that is intended for the fortification of Pearl Harbor itself.

Mr. SMITH. That entrance contemplates the emplacement of two 12-inch guns?

General CROZIER. Yes, and they have already been appropriated for. The guns are on hand and I am making the carriages.

Mr. SMITH. No work has been done on the emplacements?

General CROZIER. That I could not say.

Mr. FITZGERALD. They have not the title entirely fixed up yet. They have not got the land.

General CROZIER. Then the guns and gun-carriages are available for anywhere else. We are getting the carriages, and, as I say, we have the guns.

Mr. FITZGERALD. Have we authorized previously the 2 14-inch guns for the entrance to Honolulu?

General CROZIER. No, sir. I am asking for this in this estimate.

Mr. FITZGERALD. How long will it take to make those guns?

General CROZIER. At least two years.

Mr. FITZGERALD. It will take two years to build the island on which to erect the emplacements?

General CROZIER. They are intended to go on the island at the edge of the town. What the state of the land or bottom there is, I do not know. I do not know whether it is out of water or not.

Mr. FITZGERALD. The statement was that it would take two years to build it.

Mr. SMITH. Was not that where you and the Chief Engineer could not agree, and he said it would be built on coral?

Mr. FITZGERALD. I think he said it would take two years to build it.

Mr. SMITH. I think he said it would take two years to build the emplacements, not the island. It can not take a greater length of time to build the emplacements on a coral reef than on dry land. I may be mistaken, but the record will show it.

Mr. FITZGERALD. Would it be any use to authorize now the building of these guns, considering the condition of the places where they are to be mounted?

General CROZIER. I do not think I can turn out the guns in less than two years. It takes a good while to get the forgings. We have to advertise to get bids, and it takes a good while to make these forgings. They make one after the other.

DISCUSSION AS TO 12-INCH AND 14-INCH GUNS.

Mr. SMITH. Are you so convinced now that the 14-inch gun is so superior to the 12-inch that you say we ought not to mount the 12-inch guns?

General CROZIER. No. I am not saying that at all. The 12-inch gun is a very good gun, but it is not as good as we thought it was, because we can not use its full power. It wears out too soon. Two 12-inch guns mounted at this place instead of two 14-inch guns would be very useful indeed, but not as useful as the 14-inch guns.

Mr. SMITH. What is your surplus of 12-inch guns in the United States now?

Major HOFFER. Forty 12-inch guns.

General CROZIER. That is over and above all demands made upon them thus far.

Mr. SMITH. Those are manufactured complete?

General CROZIER. Yes, sir.

Mr. SMITH. Do you say we ought to let those guns become obsolete instead of mounting them?

General CROZIER. I would like to see them used. They are very good and powerful guns, but they are not as powerful as these 14-inch guns, because we will not work them so hard.

Mr. SMITH. The 12-inch gun is still the model gun of the Navy, is it not?

General CROZIER. It is still their largest gun. There are little differences in the bore of the guns, not essential, however. On a pinch, however, the guns could use the same ammunition.

Mr. SMITH. These guns are worth two or three million dollars?

General CROZIER. It would be a safe estimate to say that they are worth at least \$40,000 apiece.

Mr. SMITH. Your estimate is over \$50,000 for the 14-inch gun, is it not?

Major FULLER. It is \$48,000.

General CROZIER. When I say it would take \$40,000 each to build these 12-inch guns, I am below or beneath the figure, because our 14-inch gun is not really any more expensive to build than the highest power 12-inch gun that we have built heretofore. The reason for that is that it is not any heavier; there is no more gun.

Mr. SMITH. These 12-inch guns are practically worth two million dollars?

General CROZIER. Yes; between one and a half and two million dollars.

Mr. SMITH. If we abandon them, that will be a dead loss?

General CROZIER. Yes, except in this way: We will in time wear out the bores of some of our 12-inch guns used in target practice. We think they are now good for 240 rounds. When they are worn out by the obliteration of the rifling, which is the way they are worn out, we have to take them out and send them to the gun factory and bore them out and reline them. That will take considerable time. During that time we can replace them by these other guns.

Mr. GILLETT. What do you mean by some considerable time? How long will it take?

General CROZIER. I suppose when you get one of these guns dismounted and down to the wharf and shipped to the gun factory and

relined and back again, it would take a year. It is troublesome to transport them. It takes time. The plans of the National Coast-Defense Board, of which Secretary Taft is Chairman, contemplated the use of 26 of these guns in the defense of the United States alone, if they are ever carried out.

Mr. FITZGERALD. That is that unofficial board?

General CROZIER. No; that is the official board.

Mr. FITZGERALD. That is, so far as Congress is concerned.

General CROZIER. It was appointed by the President, but not in pursuance of a statute.

Mr. SHERLEY. Was that plan completed prior to the change of opinion among the officers as to the superiority of the 14-inch gun over the 12-inch gun?

General CROZIER. No. That plan took into consideration the use of the 14-inch gun in places where it would be preferable, and contemplated the use of 19 14-inch guns in the United States.

Mr. GILLET. That included the fortification of the Chesapeake Bay entrance?

General CROZIER. Yes.

Mr. FITZGERALD. For all practicable purposes would the mounting of two of these 12-inch guns be as effective outside of the possibility of their wearing out more quickly than two 14-inch guns?

General CROZIER. If we were to mount two of the highest power 12-inch guns and use them at their highest power, they would be about as effective as these 14-inch guns that we are putting there, but they would be good for only 60 rounds apiece. But these 12-inch guns that we have on hand are, none of them, of that latest and most, powerful model, and we could not get the power out of them that we could get out of the 14-inch guns; but they are powerful, and we could get as much power out of them as we are contemplating to get out of even our strongest 12-inch guns, because, as I said a moment ago, we have to bring down the strongest 12-inch guns below their maximum strength to prevent the excessive wear. They will all be brought down to twenty-two hundred and fifty feet per second muzzle velocity.

Mr. SHERLEY. Then practically there is no difference between the old and the new 12-inch guns?

General CROZIER. No, practically; because we can not take advantage of the greater strength and length of the new 12-inch gun.

Mr. SHERLEY. What difference in value would there be between the 12-inch and the 14-inch guns, as you intend to use them both at Manila?

General CROZIER. The difference will be principally in the weight of the projectile. The projectile of the 12-inch gun weighs 1,046 pounds, and that of the 14-inch gun 1,660 pounds. The velocity is not far apart. Perhaps I can give you a more direct comparison between the two guns by giving you a statement as to the penetration of armor. The 14-inch gun will penetrate 12 inches of the strongest armor plate, which is the thickness of the strongest armor on a battle ship, at about 8,700 yards, while a 12-inch gun as we propose to use it at Manila will not penetrate this thickness of armor at a range beyond about 6,100 yards.

Mr. SHERLEY. These 12-inch guns of the Army have equal force with the 12-inch guns of the Navy, have they not?

General CROZIER. They have a little more.

Mr. SHERLEY. And the 12-inch gun of the Navy is the largest now used on battle ships?

General CROZIER. Yes.

Mr. SHERLEY. That is supposed to be sufficient to destroy any opposing ship?

General CROZIER. Well, it will get through, at a reasonable range, the heaviest armor that is carried on any other ship, provided it strikes it directly. If it strikes it at an angle it will not go through.

Mr. FITZGERALD. The utility of a Navy gun is the ability with which it can be handled on a ship?

General CROZIER. They are all the time fighting against increased weight.

Mr. FITZGERALD. That is a consideration that does not trouble you?

General CROZIER. No, sir.

Mr. SHERLEY. However, if the 12-inch gun is an efficient weapon on ships, then it ought to be an efficient weapon used in fortifications?

General CROZIER. Yes; but we think it is good business to take advantage of our better conditions; that is, as to Army guns. We have more room, and we have solid earth to mount these guns on. We could go much higher, you see, Mr. Sherley, if it were necessary. We could build and handle successfully 16-inch guns if desired.

Mr. SHERLEY. That is what I am trying to come to. I am trying to come to the point where the practical efficiency is as great as can be expected from a single gun. If upon a battle ship a 12-inch gun meets those conditions, then it would seem that a 12-inch gun on land also would. If you are right in the theory that the 14-inch gun must be used in place of the 12-inch gun on land, it would indicate that our battle ships are not sufficiently supplied with heavy firing guns. In other words, the two theories are conflicting.

General CROZIER. There is nobody in the Navy, I understand, who would not prefer to have a more powerful gun than the 12-inch gun if they could get it without paying for it too much in weight.

Mr. SHERLEY. There must be some practical line where Congress in authorizing various types of guns will act?

General CROZIER. Yes. We think we were about up to that line with the 12-inch gun—the 12-inch high-power Army gun, as we designed it and built it. After having designed and built it, however, and intending to stop there, not expecting to go on to the higher caliber, we learned more about the effect of the new smokeless powder, and we found that if we used it at that strength it would wear out too soon, and consequently that dropped us back again below what we had counted on, and below what we had informed Congress of, and below the standard set by ourselves with the knowledge of Congress.

Now to get back to that standard again, we adopted a larger caliber gun with a heavier projectile, firing at a lower velocity, giving us back the power that we lost by the diminished velocity of the 12-inch gun, and a little bit more with a gun that would last a reasonable length of time, so that this 14-inch gun is now at the line where we all intended to be with the 12-inch gun; so that, so far as the sanction of previous consideration goes, the power of this 14-inch gun is what I have stated.

Mr. SMITH. Neither of them will fire as well as the old gun? Your 14-inch gun and your 12-inch gun fired at the same velocity will not go as straight as the previous 12-inch gun?

General CROZIER. I will put that in another form. Neither of those guns is quite so free from liability of missing due to error in the estimation of the range as the old gun was, with the higher velocity. If you measure your range right, the new one will be just as accurate as the old; but if you have made a mistake in the range, you are less likely to hit with the new one than with the old.

Mr. SMITH. Is it not a fact that owing to the greater curve of the projectile's course at a slow speed than at a high speed, you will strike a more glancing blow than you would under your original plan of the 12-inch gun?

General CROZIER. No. I do not think that that would cut any ice, Mr. Chairman. Both of these projectiles will strike end-on. But on account of the greater curve of the trajectory of the heavier projectile, the "danger space," as we call it, will not be so great as with a lighter projectile moving at a higher velocity.

Mr. SMITH. Do you say that the curve will not be less dangerous?

General CROZIER. In either case the projectile, striking point-on, would not strike at a glancing angle.

Mr. FITZGERALD. You mean by that an angle where the point will not strike square?

General CROZIER. For instance, if this is a projectile [indicating], if it strikes this surface normally there will be no glancing. It will either go straight through or stop. If you increase the angle, it would not strike directly, but glance off.

Mr. SMITH. Would it not strike at a different angle?

General CROZIER. The difference of the angle is so small that it is insignificant, and that point is not raised by artillery men. But one of the reasons why the Navy does not adopt the larger gun, which is no heavier than the 12-inch gun, is on account of the greater curve described by the projectile, whereby an error in the estimate of the range, for which they have poor means for estimating accurately on board ship, would be more effective—would have more effect in diminishing your probability of hitting. That is the only difference there is between the two guns, so far as those gunnery features are concerned. The probability of hitting, even with an inaccurate estimate of the range, is greater with the smaller gun with its higher velocity.

Mr. SMITH. You include in that this additional danger of missing by reason of the increased curve? That is, that is one of the problems in ascertaining the range, is it not?

General CROZIER. In ascertaining the range you do not take any account of the curve of the trajectory at all. You simply ascertain it as accurately as you can. Now if you make a mistake, that mistake will be less likely to cause you to miss with the high velocity projectile than with the slow velocity projectile.

Mr. FITZGERALD. The important thing to ascertain is the distance of your object?

General CROZIER. Yes; and if we find the distance accurately, we can hit it with either one of these guns.

Mr. FITZGERALD. If you have a greater trajectory you will be apt to go over it?

General CROZIER. It is apparent, Mr. Chairman, that if the projectile would travel in a straight line towards the object, it would not make any great difference whether you made an error in the estimate or not. It would hit it no matter what the distance was; it would hit it in the same line. But that not being the case, and the projectile traveling in a curve, during some period of its trajectory it rises above the object and then comes down on the object. Now if it rises very little above a straight line, it does not make much difference about an error in the estimate of the range, because you will have nearly the effect of the straight line. On the other hand, if it goes up, like a mortar projectile, at an angle of 45 degrees and comes down almost directly on the object, it makes a great deal of difference whether you make an error in the estimate of the range; and between those two extremes it makes the less difference, the flatter the trajectory,

Now, with those targets that we shoot at, they have some height, of course; they are usually about 24 feet high. What is called the "danger space" at any range is the space measured in the direction of the range within which that target 24 feet high would be hit by a projectile, which would hit the target in the middle if it were just exactly in the middle of this space. Suppose we had this target at such a point [indicating] with a projectile coming along with its curved trajectory so that it would hit it in the middle. Now you can move that a certain distance toward the gun, and after awhile the projectile would simply graze it on the top; and then you could move it away from the gun until the projectile would catch it at the water line. Now the two distances at which you could have the projectile hit measure the extremes of what is called the "danger space," and the "danger space" at 9,000 yards of the 14-inch gun of this velocity of 2,150 feet is about 78 per cent of the "danger space" of the 12-inch gun with a velocity of 2,500 feet.

Mr. SHERLEY. There is $\frac{1}{100}$ less chance of hitting?

General CROZIER. About 12 per cent less chance of hitting.

Mr. SHERLEY. Twenty-two per cent.

General CROZIER. That is right. But if you have measured your range right, the gun will hit it in either case.

Mr. SHERLEY. As I understand it, the reason why the Navy clings to the 12-inch gun instead of to the 14-inch is not the matter suggested by my colleague, but it is a difference in the probability of hits?

General CROZIER. Yes, sir. That is the main point.

Mr. SHERLEY. So that they consider that the 12-inch gun to them is more effective than the 14-inch gun would be, because they get more hits with it?

General CROZIER. Yes, sir.

Mr. SHERLEY. Now, do you think that the difference in penetrative power of the 14-inch gun is sufficient to override or overbalance the advantage of more hits from the 12-inch gun?

General CROZIER. The penetrative power of the 14-inch gun, as we propose to build it, and that of the 12-inch gun is not very much different.

Mr. SHERLEY. Do you consider the life of the 14-inch gun being longer than that of the 12-inch gun as sufficient to counteract the probability of more hits from the 12-inch gun, and that is the reason for the change from the 12-inch to the 14-inch gun?

General CROZIER. Yes.

Mr. SMITH. In other words, you substantially increase the life of the gun 300 per cent, and only reduce the chance of hitting 22 per cent, and reduce the "danger space" 22 per cent?

General CROZIER. Yes.

Mr. SMITH. Now, there is one matter that I do not understand yet. In your plotting room, from the data you obtain you furnish to the battery the altitude and the azimuth at which the gun is to be fired?

General CROZIER. We furnish the elevation, but not the azimuth, except in the case of mortars. We could furnish both, but the practice is to furnish the elevation and not the azimuth. The azimuth is obtained by pointing directly at the object.

Mr. SMITH. You say that no consideration is given to the curve of the trajectory of the type of gun that is to be fired?

General CROZIER. In a way every consideration is given to that, Mr. Chairman, because the curve of the trajectory of the particular gun determines the elevation at which that gun must be set in order to strike the target at a given range.

Mr. SMITH. That is the reason why I asked you, on that supposition, whether you included in the ascertaining of the range the consideration of the curve of the trajectory.

General CROZIER. Oh, yes. That is the only reason for taking the range into any consideration at all.

Mr. GRAFF. The range is the distance?

General CROZIER. Yes; and with a gun whose trajectory has a certain curve you must point it in the air at a certain angle in order to hit the target at that range, and if the curve were different you would point it at a different angle for that same range.

Mr. SMITH. That computation is made in the plotting room?

General CROZIER. Yes. We have formed and confirmed by experiments what we call a "range table" for each type of gun, for the 12-inch gun, and the 10-inch, and the 6-inch, firing a projectile of a given weight at a certain velocity. Now in the plotting room they determine the range instantly from their table or range scale arms and send it to the battery. For example, they say that a certain gun must be elevated at an angle of 13 degrees and 14 minutes.

Mr. SMITH. I supposed this was all done in the plotting room, and the elevation of the gun was telephoned or sent to the gun. That is not true?

General CROZIER. No. It would not make any difference to do it either way. You can see at once, Mr. Chairman, that with this range table, computed for a given gun, namely, that it shall be pointed up in the air at a certain angle for a certain range, instead of having that range table on a piece of paper and looking at it and directing the gunner to set the gun at that angle, you have attached to the gun carriage the scale of angles instead, and the range telephoned right down from the plotting room, where they simply call it out to the cannoneers. Instead of saying "11 degrees and 14 minutes," you simply say, "sixty-four hundred yards," and the cannoneer turns the wheel until the sixty-four hundred yards appears on the scale.

Mr. SHERLEY. Practically within the range of all your fortification guns they have a plat very much like a checker-board covering the whole range, and the range-finders simply telephone to the man

at the gun the number of the space in which the object to be fired at is in, and from the table already computed they know exactly the angle at which to sight the gun?

General CROZIER. That method has been followed, but it is not quite as accurate as the one we use now.

Mr. SHERLEY. Is not that the method used at Fort Monroe? I thought I saw it used there.

General CROZIER. That method has been used, but gives the location of the target only within limits. Now with the instruments at the two ends of a long base line we locate the target with greater refinement at the particular point where it may be, instead of locating it in a particular square of some size; and for the gun, they send down to the gun itself from the plotting room simply the range. That is all they want to know. They have the target right out there before them, and are looking at it with a powerful telescope; but the telescope does not help them to tell how far off it is. If it is a hazy day it may look to be seven or eight thousand yards away, whereas it may be only 5,000 yards off. Now for the mortars, they are down in the pit, and the gunners do not know anything about either the range or the direction of the target, and therefore they have to have both sent to them. They lay the mortars for the range as I have described, and for direction by means of a horizontal graduation, both from information sent to them. They can use this method for guns as well as for mortars, but I am telling you now the practice. They can send to guns the information both as to the range and the direction, and then nobody need be exposed above the parapet. But the direct method is better, and the exposure in that method is very slight. It is better and less complicated than the method used in the case of the mortars.

Mr. FITZGERALD. You consider in connection with the Army and Navy guns that the weight made no difference?

General CROZIER. I said there is no difference of weight between the 14-inch gun, as we make it, and the most powerful 12-inch gun.

Mr. FITZGERALD. These 14-inch guns, you say, will require greater elevation than the 12-inch guns, and that is one of the difficulties on board a ship?

General CROZIER. Yes, that is true; and if they required a much greater elevation they would have difficulty in getting it at all.

Mr. FITZGERALD. Their desire is to get the elevation as small as possible, as well as save on the weight?

General CROZIER. The difference of elevation is such that there is not any great difficulty in obtaining it. The 14-inch gun is somewhat shorter than the 12-inch, than the highest power 12-inch gun; not much, but a little, and it is less in diameter.

Mr. SMITH. If that is all, gentlemen, we will try to get back to this item.

PEARL HARBOR, HAWAII (AGAIN).

General CROZIER. I started to answer a question, but we did not get through it, Mr. Chairman, as to the distribution of this money which is estimated for between the different Insular possessions. I think I got as far as to say that \$493,000 was intended for the Hawaiian Islands, when you asked me as to the division of that sum between Honolulu and Pearl Harbor.

Mr. FITZGERALD. Two hundred thousand dollars for mortars at Pearl Harbor and \$14,700 for 15-pounders?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Have we already supplied the mortars for Diamond Head?

General CROZIER. Yes; they are supplied.

Mr. FITZGERALD. How many mortars were there?

Major HOFFER. Eight.

Mr. FITZGERALD. We supplied the 12-inch guns for Queen Emma's Point at Pearl Harbor?

Major HOFFER. Two 12-inch guns.

Mr. FITZGERALD. Did your Bureau have anything to do with the recommendation that we should abandon the erection of guns on the other side of the channel, at Hammer Point?

General CROZIER. The plans of the defenses, as they were drawn up by the Taft Board, were concurred in by myself, because I was a member of that Board; but as to that, I have not taken part in any modifications that have been made at Honolulu since the report of the Taft Board.

Mr. FITZGERALD. Originally there were additional guns at Pearl Harbor, and two, I think, at Waikiki Beach as a defense to Honolulu.

Major HOFFER. The original scheme contemplated mounting 4 12-inch rifles there I think.

Mr. FITZGERALD. Did we supply any of those to you?

Major HOFFER. No.

Mr. FITZGERALD. Were those in the original Taft Board scheme?

General CROZIER. Yes.

Major HOFFER. Six 12-inch guns for Pearl Harbor and Honolulu are intended in the original Taft Board scheme.

MANILA, P. I.

Mr. SMITH. Have you completed that harbor now?

General CROZIER. Yes, completed the Hawaiian Islands. Now, continuing on this \$2,590,000 which I am asking for, nothing is intended for Subig Bay. For Manila Bay there is intended \$240,000, plus \$464,000, plus \$348,400, plus \$348,400 again; and for inspection and tools and accessory expenses, \$76,400. This last item of inspection, and so forth, is spread over the armament intended to be procured from the whole sum, not confined to that at Manila Bay only.

Mr. SMITH. If we gave you these sums, about the same percentage of that should be allowed?

General CROZIER. Yes, sir.

CORREGIDOR ISLAND.

Mr. SMITH. Now are any of these expenditures contemplated on Corregidor Island?

General CROZIER. Yes.

Mr. SMITH. Which are they?

General CROZIER. Two hundred and forty thousand dollars for eight 12-inch mortars and carriages and one 10-inch disappearing carriage, for which the gun is on hand.

Mr. SMITH. Have any mortars been mounted there?

General CROZIER. At Corregidor?

Mr. SMITH. Yes.

General CROZIER. We have already shipped to Corregidor Island 4 mortars and two carriages for them, and we have got the remaining two carriages just about ready to ship now.

Mr. SMITH. So that four have been provided for?

General CROZIER. Yes.

Mr. SMITH. And the plans contemplate how many more—more than eight?

General CROZIER. Not on Corregidor Island.

Mr. SMITH. Are you estimating for the balance of the defense of Corregidor Island?

General CROZIER. Yes, and for the balance of the defense of the entire harbor.

CARABAO ISLAND.

Mr. SMITH. What part of this is estimated for Carabao Island?

General CROZIER. Two hundred thousand dollars for eight 12-inch mortars and carriages are intended for Carabao Island, and there have already been provided for Carabao Island two 14-inch guns and carriages, provided for last year. They are going on that island.

Mr. SMITH. Now these two items of \$348,000 each—where were they to go?

EL FRAILE ISLAND AND CABALLO ISLAND.

General CROZIER. One on El Fraile Island, which is a little island which may need some enlargement, and another on Caballo, near Corregidor.

Mr. SMITH. What is the other \$264,000 intended for besides this work on Carabao Island?

General CROZIER. Before answering that question, I will have to make a little correction in what I gave a minute ago. When I said that the fourth item was \$348,400 which is intended for Caballo Island, I estimated that two 14-inch guns which you provided last year were to go on that island, as originally intended. But those two 14-inch guns are to go on Carabao Island instead, and therefore the value of them will have to be added to the \$348,000 that is intended to go on Caballo Island, making that total \$612,400. The second item should be \$200,000 for Carabao Island.

Now I can recapitulate the whole thing, and then it will not be necessary to look back over the preceding statements. This is now for the Philippine Islands: Nothing for Subig Bay; for Manila Bay, at Corregidor Island, \$240,000; for Carabao Island, \$200,000; for El Fraile Island, \$348,400; for Caballo Island, \$612,400.

Now that is the division of the estimates between the islands in the Philippines to be fortified.

Mr. FITZGERALD. If we authorize you to mount two of the 12-inch rifles that we have on hand, instead of building two more 14-inch rifles, what difference would it make?

General CROZIER. Nobody could say that it would not be a good defense.

Mr. FITZGERALD. What would be the difference in cost?

General CROZIER. The price of the two 14-inch rifles would be \$96,000. That would be the difference.

Mr. FITZGERALD. Ninety-six thousand dollars apiece?

General CROZIER. No; for the two. We would save the guns. The carriages would be about the same.

Mr. FITZGERALD. And on Carabao Island?

General CROZIER. You have already provided last year for two 14-inch guns and carriages.

Mr. FITZGERALD. You said they would go on Carabao and we would have to take out the Caballo.

General CROZIER. At Caballo Island I am estimating for four 14-inch disappearing guns. Now if you make these 12-inch guns——

Mr. FITZGERALD. That would raise that \$172,000.

General CROZIER. If you put 12-inch guns there instead of the 14-inch, you would save the price of the guns, which would be \$48,000 apiece, or \$192,000 less in all.

Mr. SHERLEY. For the six guns we would save \$288,000.

Mr. FITZGERALD. Then the two 14-inch guns——

Mr. SHERLEY. I understand there were two that you figured on earlier there, at Manila.

General CROZIER. Two were to go on El Fraile.

SUBIG BAY.

Mr. SHERLEY. General, before leaving this matter, what has heretofore been expended, if you know, looking to the fortification of Subig Bay, which is now to be abandoned?

General CROZIER. I can tell you that, sir. There has been provided for Subig Bay, still intending to go there, two 10-inch guns on disappearing carriages, four 6-inch guns on disappearing carriages, and eight 15-pounders and mounts.

Mr. SHERLEY. That is the expense growing out of the ordnance only?

General CROZIER. Yes.

Mr. SHERLEY. You have no direct knowledge of the other expenses?

General CROZIER. No. It would be only a guess. It differs so much at different places, that I would not like to guess. It depends on the engineering difficulties that they encounter in each particular locality. The cost for the armament, which has been provided for Subig Bay and is going there is \$260,800, and in addition two guns which we already have on hand, made some time ago, but which have not had to be specially appropriated for.

Mr. SHERLEY. In the absence of further provision for the fortification of Subig Bay, of what value would these guns that have already been ordered to go there be?

General CROZIER. They would prevent the enemy from going there and occupying it as a naval base, as a comfortable rendezvous for naval vessels; and they would require, in order that Subig Bay might be used for such purposes as that, that a landing force with some kind of artillery, siege artillery, should get ashore there and get up on the surrounding heights and make that place untenable. It would require that much of an effort before Subig Bay could be used as a base.

HONOLULU, HAWAII.

Mr. FITZGERALD. As to these mortars that are to be erected at Pearl Harbor at 6 miles' distance from Honolulu, are they expected to be of any value in the defense of Honolulu itself?

General CROZIER. The field of firing of the mortars that are to be erected over there, mainly for the defense of Pearl Harbor, and the mortars that are to be erected on Diamond Head for the defense of Honolulu Harbor itself, will have their field of fire overlap to a certain extent, but not very much, and those mortars over there near the mouth of Pearl Harbor will not be a very important item in the defense of the Harbor of Honolulu.

12-INCH GUNS FOR INSULAR POSSESSIONS.

Mr. SMITH. Now let us go back to the original question that we started with this morning. If we give you two more 12-inch guns for the Insular possessions, would they be of any use to you, provided that the Committee did not give anything for Guantanamo and did not give anything for the Philippines except for Corregidor and Carabao Islands?

General CROZIER. No, sir. I have no use for 12-inch guns on Corregidor Island, and no use for 12-inch guns on Carabao Island; and if they are the only two islands you are going to consider, I would not need any appropriation for 12-inch guns.

Mr. SMITH. And you would not need to make any transfer of 12-inch guns, except to complete those that we omitted in the language last year?

General CROZIER. In previous acts—although you have oftentimes cut down our estimates so that we were not able to build the armament that we estimated for—in making the authorization to use the guns already built, you did not cut down the number correspondingly, so that we have authorizations heretofore given to use more guns than we have needed; and now, notwithstanding the fact that you did not authorize the use of the gun last year that we wanted and asked for, we need to ask you now to authorize the use of only 3 more guns, although in these estimates we ask for a good many more than 3 guns. So that if you confine yourselves, as you have just suggested, to Corregidor and Carabao Islands, we will not need to have authorized even one 12-inch gun, because we are already ahead in authorizations.

Mr. SMITH. You could not use one there in the islands I spoke of, in the Philippines, or in Hawaii?

General CROZIER. No, sir.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR SEACOAST CANNON.

Mr. SMITH. The next item on page 26 is for reserve ammunition for seacoast cannon. Again here, as in continental United States, you say that this contemplates the completion of the reserve supply of ammunition by the year 1923 for all the seacoast armament recommended by the Taft Board?

General CROZIER. That is in the Insular possessions only. The plan was, in the United States, to provide this battle reserve of ammunition for only half the number of guns, as you may remember I said yesterday. But in the Insular possessions, since we cannot manufacture the ammunition out there and they are a long way off, we contemplate providing a supply for a two hours' action for all the guns intended to be mounted in those Insular possessions, and not for the half of them only, as in the United States.

Mr. SMITH. Two hours' action would be practically the same as the life of the guns. That is, two hours' action would be two hours at full speed?

General CROZIER. Yes; but that would not be the life of the guns as we now intend to use them by a good deal, because the rate at which we expect to fire the 12-inch gun, for instance, in battle, is 45 rounds an hour. Double that would be 90 rounds. That gun as we intend to use it, is good for 240 rounds.

Mr. SMITH. Your idea, then, is that your actual battle speed will be far below the theoretical speed at which you can fire the gun?

General CROZIER. Not so very far below it. We can fire the guns under the very best circumstances and with good team work, I might say, 120 rounds an hour, two rounds a minute; two rounds a minute for a few minutes. I think that has been done.

Mr. SMITH. It was on the basis of that, given two years ago, that the maximum theoretical speed was two rounds a minute, that you concluded that the life of the gun would be two hours?

General CROZIER. Yes, it would be, theoretically. We may be a little bit at cross-purposes, Mr. Chairman, as to what a two hours' supply is. A two hours' supply for a 12-inch gun would be the number of rounds required at the rate of 45 rounds an hour, and not two rounds a minute.

Mr. SMITH. That is where I was misled as to the figures. Testimony was given last year that they could fire, on the theoretical speed, two rounds a minute.

General CROZIER. That has been done for a few minutes.

Mr. SHERLEY. General, is the life of a gun shortened in the number of rounds that can be fired by the rapidity with which it is fired, or would the gun in any instance last the maximum number of rounds, whether fired in one day or over a period of weeks?

General CROZIER. We have no evidence that it is shortened by the rapidity of the rate of firing. The natural speculation that comes to the mind, of course, is whether the heat would not affect it. But we have no evidence as to whether the amount of heat that would be imparted to the bore of the gun would affect the life of that gun.

Mr. SMITH. We did not get any answer, through a misunderstanding, to the main question on this item. You stated this is an estimate that would complete by 1923 a reserve of the ammunition for all the guns contemplated by the Taft Board. Is that right?

General CROZIER. Yes, sir; that is right.

Mr. SMITH. So that this is an estimate for your guns which in all probability Congress may never put up?

General CROZIER. That is possible. But when we are looking into the future I had to look for both the plans for guns and ammunition together.

Mr. SMITH. Assuming that we erect nothing more for some years at Guantanamo, and assuming that we authorize nothing this year except the defenses of Hawaii, believing it doubtful as to whether or not we complete those at Pearl Harbor, and assuming that we do nothing but complete the defenses at Corregidor and authorize the defenses at Carabao, is it not a fact that your estimate in a very nominal time would complete the entire reserve, with the money you have already received?

General CROZIER. This \$250,000 will provide about 16 per cent of the ammunition that will be required on the basis that I have been speaking of, for the guns that you have already authorized and those you have just mentioned as those which might possibly be authorized, and therefore at this rate about 6 years will be required to supply the whole allowance of ammunition.

Mr. SMITH. Have you a definite idea as to what guns—and in that sense I include mortars—would be mounted by a year from March?

General CROZIER. Do you mean on the basis that you have just suggested, Mr. Chairman?

Mr. SMITH. No. I mean of those authorized heretofore, how many would be mounted by a year from March?

General CROZIER. They will all be.

Mr. SMITH. So that nothing, I presume, will be mounted by that time that will be authorized in this bill?

General CROZIER. You are right, Mr. Chairman. None of the armament which you authorize in this bill will be mounted by a year from March.

Mr. SMITH. So that if we gave you the \$250,000 that you ask for, with the \$250,000 which we have already given for this purpose, you would have about 40 per cent of the reserve ammunition of all you estimate for, and 80 per cent of the reserve that you allot for the same type of guns in the United States?

General CROZIER. Yes, sir; that is a correct statement.

ALTERATION AND MAINTENANCE OF SEACOAST ARTILLERY.

Mr. SMITH. The next item is for alteration and maintenance of seacoast artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work, and the expenses of the civilian and enlisted mechanics engaged thereon. So far as this new language is concerned, it is covered fully by your statement with reference to the same item for continental United States?

General CROZIER. Yes. With reference to that item I would like to say that it is possible that I have not yet got the language as it ought to be, either for the United States or for the Insular possessions.

Mr. SMITH. I think we agreed yesterday that that ought to be modified. You can put in your notes the language that you think should go in.

General CROZIER. This change becomes particularly prominent as to the artillery mounted in the Philippines. This is for the alteration and maintenance of seacoast artillery. As I stated yesterday, we employ machinists in the different artillery districts for the work on the alteration and maintenance of armament. These men are also available to assist in mounting the new armament that may be sent to the districts, and they have been used regularly for that purpose. We have sent machinists intended to be resident machinists into the district of Manila and Subig Bay, out to the Philippines, but as the armament out there is not yet mounted there will be no alteration and no maintenance. But the machinists are out there for the purpose of assisting in mounting them, and they should be paid out of this appropriation. They can not be paid out of the appropriation for constructing these guns and carriages because they are

already finished. They are engaged in mounting them. That question comes up anew, because we have men, and will have them for a little while, who are doing nothing but mounting.

Mr. SMITH. Mounting has always been paid for out of the item for construction?

General CROZIER. No, sir. It has been paid for out of the item for maintenance, because the assistance which these machinists give has been given by the same machinists as those employed in the maintenance. You see, the great bulk of the expense of mounting is not borne by the Ordnance Department. It is done by the Engineer Department, and the work, because it is done by the Engineer troops, is generally done by the Engineer Department, and they pay for the labor and a good deal of the superintendence; but the skilled superintendence, which requires skilled knowledge of the gun and carriage, we have furnished, usually heretofore having a man on the spot for the purpose to be used. Out in the Philippines we did not have a man on the spot, and we have had to send him out there.

Mr. SMITH. The idea is to separate construction from labor in a general way?

General CROZIER. Yes.

Mr. SMITH. If you want this language in for mounting, it seems to me it ought to be under the "purchase, manufacture and test" rather than under "repair," because it is not a repair, and the only earthly object of making this distinction at all is to separate the maintenance and repair men from the new work begun. This is new work?

General CROZIER. Yes. This is already part of the new installation, and although the division you mention would be more theoretically correct in the United States, it would involve much more troublesome bookkeeping, because we would have to divide up the same man's pay between different appropriations in a way that we do not have to do now. When we have these resident machinists, they are paid regularly out of this appropriation for alteration and maintenance, and they do a certain amount of work in mounting new material.

Mr. SMITH. You have not installed much new material in the United States, and it will not last long in the Philippines?

General CROZIER. I would have no objection to having this work of mounting, which will not be expensive, so far as the Ordnance Department is concerned, authorized in the appropriation that we passed a moment ago, for the construction of these guns, if you like.

Mr. SMITH. I suppose you would have the same ground of objection if we took some of this money out and put it in for mounting? You would have the same embarrassment?

General CROZIER. Yes. It would cause us to keep clerical track of a very small matter, Mr. Chairman.

Mr. SMITH. Send up such language as you want, General, and we will look it over. You say it is a very small matter all the time?

General CROZIER. Yes, sir; it is a small matter. The employment of these men for assisting in mounting the armament is a small matter. As I say, the bulk of the expense of mounting is borne, not by the Ordnance Department, but by the Engineer Department. Twenty men or more will be engaged in mounting these guns on Corregidor Island, and we furnish this one machinist.

Another element of cost that comes into this estimate of \$50,000 which I am making for alteration and maintenance, and doing it before any of this armament is mounted, is the supply of spare parts which are subject to breakage. They have to be supplied in advance, and particularly ought to be supplied away out there, on the other side of the world. That is a proper charge for maintenance, and 3 per cent of the cost of this armament out there would amount to \$39,000. Three per cent in spare parts is a very large estimate. Perhaps we cannot use \$39,000 for spare parts if we do not get more than \$50,000 for alteration and maintenance.

Mr. SMITH. We kept this sum down because you did not have, at the last hearing, any guns to mount there.

General CROZIER. Right at the commencement there has been no chance of deterioration or breakage of the armament. It is necessary now to have some spare parts.

Mr. SMITH. If you had \$39,000 for spare parts, and you got an appropriation sufficient to cover that and the ordinary maintenance, could not your appropriation be properly reduced next year?

General CROZIER. It might be, unless some improvement should come up that we do not foresee now.

Mr. FITZGERALD. You would not like to promise?

General CROZIER. I have a good many bright young men in my Department, and if they should think of something to improve the armament, I should dislike to remain without it. [Laughter.] If you cared to put the new language in this, you could put one or two words in the language which would cover this installation by making this read, "For the installation, alteration, and maintenance of the seacoast artillery."

Mr. SMITH. That would enable you to use it for almost everything, would it not, General? You could use that for freight, could you not?

General CROZIER. I would not use it for freight without a fight with the Quartermaster-General. [Laughter.]

Mr. SMITH. The minute you used the word "installation," it could be taken by the Quartermaster-General, could it not?

General CROZIER. I do not think that he would try it. I think it would have to be covered by the word "transportation" to enable him to take it. "Transportation" is the term always used.

Mr. SMITH. "Installation" is broad. What is the objection to "mounting?"

General CROZIER. I have no objection. You can say "mounting, alteration, and maintenance." But then it might cover the whole mounting. The Engineers might get after it.

Mr. SMITH. Suppose you send up such language for both of these items as you would like, and we will go over it carefully before we act.

PURCHASE OF SUBMARINE MINES, ETC.

Do you wish to tell us anything about this item of submarine mines and appliances, or do you prefer that we should get that from the Chief of Artillery?

General CROZIER. I think you had better get that from the Chief of Artillery. I do not make that estimate.

AUTHORIZATION AS TO MANUFACTURING OPERATIONS.

Mr. SMITH. Do you regard this provision here as permanent law? General CROZIER. I have put it in in a little different language. It needs to be reenacted each year. It is not permanent. I have changed the language a little bit.

Mr. SMITH. I doubt whether that is not permanent law, the way it is worded.

General CROZIER. It says that all material purchased under the foregoing provisions of this act," etc.

Mr. SMITH. I do not think last year's bill said that.

General CROZIER. Oh, that is not the same one. That is permanent legislation. I was thinking of the next one.

Mr. SMITH. That is the reason for the omission, because it was regarded as permanent law by you?

General CROZIER. That is the reason.

Mr. SMITH. Is there any existing law that you regard yourself as modifying except as indicated in the language in this proposed section on page 28?

General CROZIER. None which I modify except that. As explained, the object of the additional clause is to allow material to come in free of duty.

Mr. FITZGERALD. "Furnished without charge," what does that mean?

General CROZIER. Sometimes a foreign manufacturer will send us over something in the way of a projectile or some such material to experiment with and he does not charge anything in the hope that it will make business in the future.

Mr. FITZGERALD. And the government has to pay duty on that?

General CROZIER. Yes, sir. The duty does not amount to anything and we would not care about it, because there is so little of it, but the correspondence we have to go through is a great bother in those cases.

Mr. SMITH. This, however, practically gives the Secretary of War as long as the quantity is limited, power to import free anything that is covered by this act.

General CROZIER. That language has been in the bill for twenty years.

Mr. SMITH. Where is the old language?

General CROZIER. It is all except the last clause. I will read the language of the last act, which is the same as for many years previous. It reads as follows:

That all material purchased under the foregoing provisions of this Act shall be of American manufacture, except in cases when, in the judgment of the Secretary of War, it is to the manifest interest of the United States to make purchases in limited quantities abroad, which material shall be admitted free of duty.

Mr. FITZGERALD. And then the new language is:

"as shall other military stores similarly procured, or furnished without charge?"

General CROZIER. Yes, sir. It has the effect of extending this authority to military stores purchased under acts other than the Fortification Act and also to the material that is furnished without any charge whatever, as the samples I have referred to.

Mr. FITZGERALD. Suppose we put in instead of the last clause "as well as other military stores furnished without charge?"

General CROZIER. That would meet the point of the samples which I spoke of.

Mr. FITZGERALD. You are asking us to permit military stores that may be purchased out of appropriations in the Army bill or in some other bill to come in?

General CROZIER. Yes, sir.

Mr. FITZGERALD. And I doubt very much whether the House would care to legislate in this bill affecting appropriations from other Committees?

General CROZIER. That would be subject, I suppose, under the rules to a point of order, but we have had many years of experience now and I thought that Congress would be convinced that we take very sparing advantage of this authority because we do not like to get the material abroad. Every once in a while there is something new which comes along that we want to try. For instance, when we adopted the new powder for small arms ammunition the best sample we got was from abroad. We tried it and it answered first class and then we made our people produce it in this country. In the meanwhile, while waiting for them to produce it we gave an order abroad, because there was a crying need to get some of this small arms ammunition.

Mr. FITZGERALD. Are you compelled to pay duty on supplies purchased under appropriations made in the Army bill?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Has that ever been considered by the Military Committee?

General CROZIER. I do not believe it has ever been presented to the Military Committee. I have never presented it. I submitted it here because we already had a clause to the same effect and it seemed a little less cumbersome.

Mr. SHERLEY. I notice in this section, which I understand is existing law except for the last two lines, the limitation upon purchases that may be made abroad, the words in "limited quantities." Has the Department had any reason to be handicapped by virtue of that limitation?

General CROZIER. No, sir; it has caused no inconvenience.

Mr. SHERLEY. With that limitation omitted would not the Department be in a position to obtain better prices either here or abroad?

General CROZIER. We could obtain better prices if we cared to get the material abroad, but it has never been the policy of the War Department to get material abroad when we could get it in this country. It has been considered that it was a class of material for which we ought not to be dependent upon any foreign power.

Mr. SHERLEY. I understand that, but it occurred to me that if you were to be given power to buy abroad at all that there was no reason to limit it, or how have you construed the words, "in limited quantities?"

General CROZIER. Perhaps I can illustrate it by citing an instance. By far the largest purchase that has been made under that authority for current use has been the purchase of 50 field guns and carriages from a German firm three or four years ago when we first adopted this new field piece. The reason for making the purchase was that we had a considerable sum of money which had been appropriated in previous years but which we had not expended, because we were

about to adopt a new gun, and we filled up everybody in this country with work so that we could not get any more material except on very long time, and we were very anxious to get this material. Therefore we bought these fifty guns from this German firm. That is by far the largest item. There is no similar item to it. The next largest item in the way of expense was for some experimental forged steel which was bought in Europe at the time the rehabilitation of the coast defense was first commenced in 1888, which steel we used to construct our guns before the steel factories which had been established in this country under the encouragement of the legislation connected with the rehabilitation were able to furnish the material. Those are the only two items of importance which were purchased under this authorization. We purchase a sight once in a while.

Mr. SHERLEY. I am thoroughly in accord with your suggestion that the policy of the government should be to encourage the manufacture of war material in our country so as to make us independent of any other country, but it occurred to me that the power to buy abroad not only in limited quantities, but in large quantities, might be a very effective weapon to prevent extortion on the part of American manufacturers of the government, and it was for that reason I suggested to you that it would be advisable to take off the limitation that reads "in limited quantities?"

General CROZIER. I could not add anything to your own knowledge on that subject. Of course I could advance something in accordance with the same idea, but it would be no different from what you could probably arrive at yourself. Our experience is that for part of our material we pay a higher price than we would have to pay abroad. Whether the price would come down if this limitation were removed, is only a guess. I will add to the statement I made a moment ago that we also purchase abroad a certain grade of raw silk cartridge bag used in seacoast cannon because up to the present time we have not been able to induce anybody in this country to make it, although we have tried several times.

BOARD OF ORDNANCE AND FORTIFICATION.

Mr. SMITH. The next item is "Board of Ordnance and Fortifications." What is your available balance under that item?

General CROZIER. About \$7,000. Out of that we will have to pay certain salaries during the remainder of the fiscal year, the salary of the civilian member, the salary of the secretary, and the salary of the messenger.

AIRSHIPS.

Mr. FITZGERALD. How much of this appropriation has been expended on airships?

General CROZIER. There was expended on Professor Langley's airship several years ago, I think, \$50,000. I was not a member of the board at that time. That is my recollection. There has been recently allotted for airships \$46,000.

Mr. FITZGERALD. Is that the money out of which the present experiments are being conducted?

General CROZIER. Yes, sir; mostly.

Mr. FITZGERALD. Is there any money out of which the Department can purchase these airships or is this merely for experimental purposes?

General CROZIER. Only for experimental purposes, we have no money that can be applied for purchases.

Mr. FITZGERALD. Have they not invited bids to furnish airships?

General CROZIER. Not in quantity, only experimental.

Mr. FITZGERALD. These are all purely experimental?

General CROZIER. Yes, sir.

Mr. FITZGERALD. I read that they had invited bids for airships. I do not recall the exact number of persons who had submitted estimates, but I think three were to be tested. Have you any information as to that?

General CROZIER. Three are to be procured and tested, three airships to be supplied by three different sets of people, the object being of course to try different ones. These ships must meet certain specifications under the terms of the contract which will be made.

Mr. SMITH. What was your balance a year ago under this item?

General CROZIER. The balance a year ago was \$70,000 and there was appropriated \$25,000, and we have now left about \$7,000.

Mr. SMITH. If you put \$46,000 of this money into airships do you need as much as a hundred thousand dollars next year?

General CROZIER. It is impossible to tell, Mr. Chairman. The majority will be needed for experimental purposes. We have not now in view any object for which we would expend the money, but the estimate is based on experience. Going back to 1895 and 1896 there was appropriated for each one of those years \$100,000; for 1897 and 1898, \$150,000, and then for the year 1899 and up to and including 1905 there was appropriated each year \$100,000. We did not expend those sums of money, the balance accumulated, and so I suggested to the committee here myself that the appropriation be cut down, and in 1906 it was reduced to \$10,000 and the next year, at my suggestion, it was reduced to \$5,000. The next year it ran up again to \$25,000, at my suggestion. In order that we might be able to conduct any experiment which might present itself, which might be thought desirable without waiting for an appropriation, the Board has asked for an appropriation of \$100,000.

Mr. FITZGERALD. Do you think that you can buy ships under the language of this appropriation?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Under what language?

General CROZIER. "Implements of warfare."

Mr. SMITH. Has any nation so developed the airship as to consider it an implement of war?

General CROZIER. I think it might be so construed. Dirigible balloons which are airships have been used quite successfully. They have hovered about in the air and have gone certain distances.

Mr. FITZGERALD. They would be valuable merely for the purposes of observation?

General CROZIER. Yes, sir. That is the only thing that they have been considered good for up to the point of the present development.

Mr. FITZGERALD. Do you know how much one of those airships would cost? I suppose it is intended by the board, if the tests are in any way successful, to purchase them?

General CROZIER. The most expensive one we are getting will cost \$25,000. I fancy that will perhaps cover some expense of experimentation on the part of the men who supply it.

Mr. FITZGERALD. Are those machines of such a character that they will require experts to operate them or can they be operated by men in the service?

General CROZIER. It is stipulated that they shall be of so simple construction that an intelligent man can be instructed within a reasonable time to use them.

Mr. FITZGERALD. Will they require more than one person?

General CROZIER. Two persons. Those are the conditions practically under which the payment is to be made. We do not know now how practicable those things will in be use. We do know that a man with proper skill and with plenty of time for preparation can fly. He can go off and fly around in a circle and come back.

Mr. FITZGERALD. At how high an elevation?

General CROZIER. There is no limit to the elevation.

Mr. FITZGERALD. At what elevation have they navigated the ships?

General CROZIER. They have spoken of one or two thousand feet. They have also flown in circles and come back to the starting point at a comparatively low elevation, not more than 30 or 40 yards.

Mr. FITZGERALD. At an elevation of one or two thousand feet could one of those machines be utilized to get sufficiently near to a hostile force for observation purposes and be free from any danger?

General CROZIER. I do not think that you could say that they would be free from danger, but there is no reason if they can fly at all why they could not go up high enough in the air to be free from danger.

Mr. FITZGERALD. Do both men operate the machine?

General CROZIER. No, sir; one man operates the machine.

Mr. FITZGERALD. Has there been any marked advance in the airships since the Langley airships?

General CROZIER. Professor Langley was the first man who ever achieved horizontal mechanical flight even with a model. He built a ship intended to carry one man. He never got it started in the air. His difficulty was with his launching apparatus and his funds ran out before he got it so he could get it free from the earth. Since then those difficulties have been overcome sufficiently so that people have gotten started off and flown in machines. As far as the advance in principle is concerned, I can not say that there has been much made because he had the aeroplane principle and the principle of a propeller actuated by a light engine for its power. That is all these people have been using recently. The important point with reference to flying machines is the method of steering and I fancy their recent efforts have been directed particularly to that, steering in both a horizontal and a vertical direction. For some time in France the people were able to fly in a straight line but nobody won the prize which had been offered for circling and coming back to the starting point. A short time ago a man won that prize, the difficulty being in turning.

Mr. GRAFF. Was that a balloon?

General CROZIER. No, sir; there has been no difficulty with balloons. So far as the balloons are concerned the advance which has been made is in the construction of engines of light weight, and they have put the engines actuating propellers onto the balloons which have been known for many years, and therefore they become dirigible and can go at a certain rate. That is all there is in it.

Mr. FITZGERALD. Does the board furnish any money to inventors to enable them to complete their machines?

General CROZIER. No, sir.

Mr. FITZGERALD. Does it compel them to furnish the machine to experiment with?

General CROZIER. Yes, sir.

Mr. FITZGERALD. And then if it meets certain tests, they get the compensation?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Would it be more advantageous to wait until some of these men had perfected their machines, or for the Government to encourage them?

General CROZIER. We think it would be more advantageous for the Government to encourage them because we have thought, perhaps, in the first place, that the Government would be the principal purchaser, and, moreover, we have gone about it pretty conservatively, because it has been ten years since Professor Langley achieved horizontal flight. We made an allotment for him to build his machine, and in that case the money was advanced because he was a Government official and the machine was built by the Government. Since then, although the talk of flying machines has filled the air, the Board of Ordnance and Fortification has refused to spend any money, I think, until this point has been reached where several men have really flown through the air.

Mr. FITZGERALD. Then, in ten years the entire amount allotted for that purpose has been about \$100,000?

General CROZIER. Yes, sir.

Mr. SMITH. Are all these machines practically heavier than air?

General CROZIER. Three of them are heavier than the air. The allotment has been made to be expended by the Chief Signal Officer, under whom all of this subject of dirigible balloons comes.

MACHINE GUNS (AGAIN).

There are several matters to which I wish to direct the attention of the committee. The first one is in reference to the item of \$110,000 for machine guns. Mr. Fitzgerald called attention to the fact that I had considerably increased the number which he stated I thought we should ultimately get, which is true, and it was well brought out that it was because I had concluded that I would bring to your notice the number that would be necessary for 650,000 men instead of 350,000 men, as the number which Mr. Fitzgerald reminded me I mentioned last year. At the rate we are going now it would take something like ten or twelve years. To procure the number I am now suggesting at the rate of the estimate would take twenty-four years. So there is lots of time to decide whether we will endeavor to supply an army of 350,000 men or an army of 650,000 men. The appropriation I have asked for can be very greatly increased without there being any occasion to notice this difference in the size of the Army which I have spoken of supplying.

Mr. FITZGERALD. We got 60 per cent in ten years by making comparatively small appropriations with the exception of three years and if we made a very large appropriation we would supply the original estimate in about five years.

General CROZIER. I have estimated that with this money I can procure 35 of these guns and in accordance with the statement made last night the number necessary for 350,000 men would be something over 400 or 500 and so it would require ten or eleven years to get those even at this rate. Therefore, it is not important, unless the Committee will greatly exceed the amount I have estimated, to stop now and think of whether we will supply an army of 350,000 men or 650,000 men.

AMMUNITION FOR INSTRUCTION OF STUDENTS AT PRIVATE INSTITUTIONS.

In reference to the use of ammunition for the instruction of students at private institutions, Mr. Chairman, you were strongly of the opinion yesterday that this ammunition certainly should not be used for anything except strictly military institutions. There has been defined by an order which deals with this subject of the issue of military material to institutions the classes of institutions which may be considered strictly military. These institutions are divided into Classes A, B, BA, C, and D. Class A is defined as follows:

Schools or colleges whose organization is essentially military, whose students are habitually in uniform, in which military discipline is constantly maintained, and one of whose leading objects is the development of the student by means of military drill, and by regulating his daily conduct according to the principles of military discipline.

In another part of the order there is stated the classes of institutions, but it is more definitely interpreted in a letter of October 14, 1906, to me as follows:

Upon the recommendation of the board of inspectors of institutions of learning at which officers of the Army are serving as professors of military science and tactics, approved by the Acting Chief of Staff, the Acting Secretary of War directs that all military material except such as may be obsolete be withdrawn from all such institutions, except those of class A, as defined in General Orders, No. 155.

This confines the use of artillery material to institutions of class A.

We have heretofore made an allowance of blank ammunition to institutions having artillery students and the allowance has amounted to about \$30 to an institution.

Mr. FITZGERALD. How many institutions?

General CROZIER. About twenty institutions of Class A.

Mr. FITZGERALD. Then \$1,000 will be ample?

General CROZIER. Yes, sir. I am not asking for an appropriation, but \$1,000 would be very well as the limit.

Now, in this language which I have proposed you might state as follows:

For the purchase, manufacture, and test of ammunition, subcaliber tubes and other accessories for mountain, field, and siege artillery practice, for the instruction of students at the institutions of Class A, to which the issue of material is authorized in General Orders, No. 155, from the War Department, dated July 24, 1907, within the limit of \$1,000 in value, including the machinery necessary for their manufacture at the arsenals.

MILEAGE OF ORDNANCE OFFICERS.

There is another matter which I would like to bring to the attention of this subcommittee and this is the subject of mileage of officers who are traveling on duty inspecting the material which is procured by the Ordnance Department. As the law now stands, all

such mileage must be paid out of the appropriation for the mileage of the Army made in the Army Appropriation bill, and when I wish an officer to travel for the purpose of inspecting the material which I am constantly procuring and as I am all the time needing them to do, I make an application to the Adjutant General for the issue of an order, by direction of the Secretary of War, for him to have the travel which is necessary. There is never any friction in procuring those orders. There is good will in the offices of the Chief of Staff and Secretary of War in issuing the orders and no disposition to limit the amount of travel so as to embarrass me, except when the mileage appropriation runs short, that appropriation being drawn on for the general purposes of travel of officers when not traveling with troops. At the present time the mileage fund is very low. I have not depleted it greatly because I have not had my officers do any more traveling than they have been doing in years past, but there has been other travel done which I think was not expected and so there is but a little of this fund left and I have been recently unable to get travel for my officers to inspect the material and some of the material is not being inspected as thoroughly as it should be. Now, it seems to me that the expenses of travel of officers in inspecting this material is just as much a part of the expense of procuring the material as the steel or wood or iron that goes into it, and when one thinks of the mileage of the Army for the transportation of officers he is not thinking of the cost of procuring this material, but he is thinking of sending officers around on the duties which the Army is ordinarily for. When I can not get the material properly inspected for lack of mileage funds, which I have very little to do with the expenditure of, and in consequence poor material may be received into the service, I may not be able to remove the responsibility and the Ordnance Department will be blamed, although it was not through any fault of theirs that it was not properly inspected, but was because we were not able to get the travel orders. Therefore, I have asked the Secretary of War to forward through the proper channels to Congress a request that, when officers of the Ordnance Department travel in compliance with orders from the Chief of Ordnance in connection with the procurement or maintenance of ordnance property their mileage shall be charged to the appropriation authorizing the purposes which the travel is connected with; *provided* that the amount so expended in any one fiscal year shall not exceed \$15,000. I believe, perhaps, that has been referred to the Military Committee of the House of Representatives. I am not as familiar with your rules as you gentlemen certainly are. That involves military legislation and does not involve an appropriation and has been no doubt properly referred, but I wanted to inform this Committee so that if it should appear in the legislation proposed by the Army bill that the reason might be known.

Mr. SMITH. This is not the only branch of the War Department engaged in construction?

General CROZIER. No, sir.

Mr. SMITH. How is the mileage of the inspectors of the Quartermaster's Department paid, where they are constructing buildings?

General CROZIER. They have to be paid out of the mileage of the Army.

Mr. SMITH. How are the representatives of the Engineer Corps paid?

General CROZIER. Those who travel on work connected with the improvement of rivers and harbors are paid from the Rivers and Harbors appropriation, but those who travel on work connected with the fortifications are paid from the Army appropriation as my officers are.

Mr. SMITH. How about the Signal Corps?

General CROZIER. They are also paid from the mileage appropriation in the Army bill.

Mr. SMITH. Whatever argument could be made in your behalf would be equally forcible in the other cases?

General CROZIER. Yes, sir; although I think we have more of it than any of them. I think our material is made about the country at different places in such a way as to involve more travel than the other departments are required to make.

Mr. FITZGERALD. Have you been embarrassed this year an account of the lack of the mileage appropriation?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Has any of your officers been required to travel in order to take the horseback test?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Is that charged to your department?

General CROZIER. That is charged to the general mileage appropriation, but not particularly against the Ordnance Department. The ordnance officers all do some traveling under orders.

Mr. FITZGERALD. Do you use the same amount of money for travel duty each year?

General CROZIER. Yes, sir; about the same.

Mr. FITZGERALD. Could not by regulation of the Department a certain amount of money appropriated for mileage be set apart for the use of your bureau and take care of you in that way?

General CROZIER. You mean in the War Department?

Mr. FITZGERALD. Yes, sir.

General CROZIER. That could be done. Then the question would come up of course that I have raised here whether after all that is a proper fund to be used and whether the appropriation for the procurement of material is not the proper one.

Mr. SMITH. Would this cover the inspection of repairs, alterations, etc.?

General CROZIER. Yes, sir. There is another point. It has been decided by the Comptroller and of course thoroughly understood by Congress that the appropriations that are made for the procurement of this material are not appropriations for the support of the Army, they are permanent appropriations. The mileage appropriation, however, is an appropriation made for the support of the Army, it is annual, and expires with the fiscal year.

Mr. SHERLEY. Has your department any information as to the cost of similar ordnance abroad as compared with such cost here, what it costs other governments as compared to what it costs our Government?

General CROZIER. It is difficult for us to get those prices, but the private manufacturers complain that we do not pay as high prices as are paid to private manufacturers abroad by the governments, and the reason for that they say is because we get our material on a basis of competition, which a certain class of these manufacturers do not like. There are manufacturers in this country who main

tain something of a designing staff and they think that they ought to receive a price which will take into consideration the expense which they are put to in maintaining that designing staff. I have replied to those gentlemen that if any of them produce anything that is an improvement on our material they can patent it and we will pay them a corresponding price, but that most of our material is designed by officers of the Army and therefore we can give simply manufacturer's prices for building it. Abroad a great deal of the material which is used is designed by the private manufacturers.

Mr. SHERLEY. The additional cost there is due to the additional service rendered?

General CROZIER. Yes, sir.

Mr. SHERLEY. Do you know anything as to the comparative prices of material, leaving out compensation in the way of services for design and invention?

General CROZIER. We recently bought a little small arms powder abroad. It was more than a sample, but not a very large quantity, and the price was about the same that we pay here. The fifty guns I spoke of a little while ago that we bought abroad several years ago, field guns, we got at a considerably less price than we paid at the same time for similar guns in this country, but that was not the reason why we bought them abroad. We bought them because of the earlier deliveries. At that time our people in this country were all very busy.

Mr. SHERLEY. You have no general figures, however, touching the prices paid by other governments for similar ordnance?

General CROZIER. No, sir; no general figures. They are very hard to get because they usually buy by an arrangement which is private between the government and the manufacturers and it is not generally known what the prices paid are. It is very different from the process we have here, where we make purchases after public advertisement and public award of contract, which process I have nothing to say against and which I have no desire to change. It is a very comfortable process when accusations raise their heads in regard to the conduct of the disbursing officers.

Mr. SHERLEY. There has been no effort, I suppose, on general lines, in your department looking to ascertaining the prices at which material could be furnished abroad to the department?

General CROZIER. No, sir; that has not been gone into.

PRICES OF POWDER (AGAIN).

Mr. FITZGERALD. There is one further question in connection with the powder. In a pamphlet which I have here it is stated that the estimated cost of manufacturing powder at the Indian Head powder factory is 47 cents a pound for the smokeless powder. You stated, I think, that the price fixed by a board for the purchase of powder was 67 cents?

General CROZIER. Yes, sir.

Mr. FITZGERALD. Do you know what percentage of that was allowed for profit?

General CROZIER. Major Hoffer who is with us was a member of the board and, perhaps, he can answer that question.

Major HOFFER. In arriving at the price of 67 cents it was necessary to take into consideration many things in addition to the actual cost of manufacture at the Naval Powder Factory. Forty-seven cents

represented the actual cost at that factory, exclusive of the pay of the officers, with a maximum output of the plant which is always an economical output. Then, in addition, it was necessary to take into consideration the fact that it is not possible to place orders with the powder companies to fully occupy their extensive plants that they had built at a time when the orders of the Army and Navy required the delivery of large quantities of powder. It was also thought proper to take into consideration the fact that private companies of that kind have to maintain a large number of high priced officials, which in the case of the Army and Navy are replaced by officers of the service whose pay bears a much smaller proportion to the cost of manufacture. There was also an allowance made for the deterioration of the plant, the necessity of replacing machines at certain intervals, the fact that from time to time methods of manufacture are changed rendering certain parts of the plant obsolete, and then a reasonable profit. Exactly what the percentage allowed for profit was I am unable to state. The price of 69 cents, which was fixed a year ago, was based upon data furnished the board before I became a member of it, and the reduction to 67 cents this year was merely a reduction to correspond to a reduction in the cost of the powder as manufactured at the Indian Head proving grounds, resulting from the installation there of certain improved processes, which the powder companies either were using or could use.

Mr. FITZGERALD. In your estimate did you take 47 cents a pound, the estimated cost at Indian Head, as the cost of manufacture?

Major HOFFER. That was based upon a statement submitted by the Ordnance officer in charge of the Naval Powder Factory.

Mr. FITZGERALD. Did that 47 cents include only the cost of manufacturing the powder, or did it also include the expense of experiments and the analyses of powder supplied by private concerns under contract?

Major HOFFER. It was supposed to include only the cost of the labor, the material required for the manufacture of the powder, and a certain percentage for fire losses and depreciation of buildings and machinery.

Mr. FITZGERALD. In those figures they did not include the expense of salaries paid to the officers on duty there?

Major HOFFER. No, sir; they did not include the salaries of commissioned officers.

Mr. FITZGERALD. In keeping the accounts in the contest of building the *Connecticut* at the government Navy yard and the *Louisiana* at a private yard they not only estimated the salaries of the officers, but they charged up against the government ship the cost of educating those officers at Annapolis, and it seems to me extraordinary that they used one plan in estimating the cost of one thing and another plan in estimating the cost of another thing.

Major HOFFER. The pay of the commissioned officers connected with the Naval powder factory would be a very small item.

Mr. FITZGERALD. If it is small enough not to amount to anything, you should not take it into consideration as against the expense of these salaried officers; otherwise, it should be taken into consideration. I would like to obtain an exact estimate of what it costs the government to manufacture powder?

General CROZIER. We will know in another year what it costs us to manufacture powder. In all the prices which we in the Ordnance Department give and in our price list of material which we publish for issue to the service we include the pay of officers and we include the pay of enlisted men, we include every item that a private manufacturer making the material would have to include, except profit.

Major HOFFER. The exact data that this committee desires was considered by the joint board when they fixed the price of powder more than a year ago. In reducing the price from 69 to 67 cents the Board merely considered this year the reduction in the cost of producing powder at the Naval Powder Factory.

OFFICE OF CHIEF SIGNAL OFFICER.

STATEMENT OF BRIG. GEN. JAMES ALLEN, CHIEF SIGNAL OFFICER, U. S. A.

FIRE CONTROL INSTALLATIONS AT SEACOAST DEFENSES.

Mr. SMITH. The first item is on page nine of the bill, "For operation and maintenance of fire-control installations at seacoast defenses," and your estimate is \$145,518.36?

General ALLEN. Yes, sir.

Mr. SMITH. The operation and maintenance of the fire control system has heretofore been paid out of the same appropriation as the construction?

General ALLEN. Yes, sir.

Mr. SMITH. And you now propose to separate the new work from the operation and maintenance?

General ALLEN. To separate the maintenance from the installation.

Mr. SMITH. Have you anything, General, upon which to base this estimate of the cost of operation and maintenance, in view of this being for the first time separated?

General ALLEN. The property we have invested in the fire-control system amounts to \$1,018,183.63, in other words, ten times \$110,000. That makes the estimate on the basis of ten per cent.

Mr. SMITH. When this provides for operation and maintenance of fire control installations that only means for the operation and maintenance of the Signal Corp's proportion?

General ALLEN. Yes, sir; that already installed.

Mr. SMITH. It does not include anything for maintenance of the Engineer work or the like of that?

General ALLEN. No, sir; simply the fire-control work.

Mr. SMITH. Are you able from your books to show what has been the average actual cost of operation and maintenance during the last fiscal year?

General ALLEN. It has been approximately this amount. I have not the exact figures. For the first few years we figured on five per cent. We found that was not enough. Then we had to get more money out of the general fund.

Mr. SMITH. Could you tell us how much money you got last year out of the general appropriation for construction?

General ALLEN. Yes, sir; I will tell you every item I have had since 1902. 1902, \$35,000; 1903, \$250,000; 1904, \$389,000; 1905, \$500,000; 1906, \$410,000; 1907, \$323,000; and 1908, \$467,000.

Mr. SMITH. That was not your allowance for operation and maintenance, that was your allowance out of the construction fund?

General ALLEN. That was the whole amount we had; it includes installation and maintenance.

Mr. SMITH. What we want to know is whether you are able to tell us how much has been allotted in these years for operation and maintenance?

General ALLEN. As long as we are installing we have to pay maintenance out of the installation fund, and therefore it all goes in together. Until we turn it over to the Artillery, during the construction, there is both maintenance and construction, and you can not differentiate them.

Mr. SMITH. Will that always be true?

General ALLEN. No, sir; not when we turn it over to the Artillery.

Mr. SMITH. You always have some work that is in the process of installation where you will have both construction and maintenance?

General ALLEN. This money is simply to maintain what we already have. We already have a lot of money appropriated for installation.

Mr. SMITH. I do not think you quite grasp what we are wanting to know. Most of this work is already turned over to the Artillery?

General ALLEN. A great deal of it or it is just in the process of being turned over.

Mr. SMITH. Have you any way in which you can ascertain even approximately what has been the actual cost of operation and maintenance of any portion of this work in the past?

General ALLEN. We have that figured. It is about 10 per cent, as near as we can make it, of the installation.

Mr. SMITH. You are giving those figures of what you have spent for operation and maintenance, from your books, so it is a calculation rather than a mere surmise?

General ALLEN. It is a calculation. We first figured on five per cent, which was not large enough for maintenance. For instance, at New York Harbor, between the two forts there, across the Narrows we have put in certain cables and something may come down and rip them all out. That is a part of maintenance and if we have not enough money to put them back they stay down. It is not accurate, but ten per cent is as near as you can come, based on previous experience.

Mr. SMITH. What I want to know is whether you have gone into the figures already?

General ALLEN. Yes, sir. We are not guessing at all. We have gone over these figures a great many times.

Mr. FITZGERALD. What do you propose to do out of this fund when you say "operation and maintenance?"

General ALLEN. We propose to maintain all the fire-control system on the Atlantic coast and the Pacific coast.

Mr. FITZGERALD. That is too general. I want to know what particular things your Corps will do. Will you have charge of the instruments and the stations?

General ALLEN. The entire fire-control installation which consists of all the electrical instruments and cables, all things connected with fire direction and control.

Mr. FITZGERALD. Do you have charge of the buildings in which the instruments are installed?

General ALLEN. The Engineer Department has charge of the buildings, but we put in the instruments.

Mr. FITZGERALD. You maintain them?

General ALLEN. Yes, sir. We install the instruments and supply the necessary labor in connection with them.

Mr. FITZGERALD. You have stored some cables?

General ALLEN. Yes, sir; at many places. We have a good deal of material on hand.

Mr. FITZGERALD. Is there any difference in the cost of maintaining the wires below ground and overhead?

General ALLEN. Fire-control installation is all underground, except what we have in some of the small places.

Mr. FITZGERALD. In the underground installation the deterioration is not very great?

General ALLEN. It is very small, unless laid under water, when it is very great. All the other lasts a long time. The underground work ought to last indefinitely, but the deterioration of instruments, cables, and all sorts of things is considerable when you remember the amount of money you have invested.

Mr. FITZGERALD. You base your figures upon the amount of money invested in what?

General ALLEN. In cables.

Mr. FITZGERALD. And the conduits?

General ALLEN. We do not put them in, the Engineers put them in. There are the underground cables, the submarine cables, and all the different types of electrical apparatus connected therewith. It is a complicated system.

Mr. FITZGERALD. The instruments that are used, do they deteriorate rapidly?

General ALLEN. Yes, sir. They have to be taken care of. They are very delicate instruments.

Mr. FITZGERALD. You have not given us the detailed information on which we can figure out how it will take this particular amount of money?

General ALLEN. The amount of money simply represents the amount of material and the amount of the installation.

Mr. FITZGERALD. Is this money to be expended for labor or for material?

General ALLEN. About \$100,000 for material and the other \$45,000 for labor. We have to have an extra staff of people to keep these things in condition all the time.

Mr. SMITH. As I understand it, you tried setting aside 5 per cent of the appropriation and you found that to be insufficient?

General ALLEN. Yes, sir. We got that out of the general fund. Then they gave us a little more for general maintenance.

Mr. FITZGERALD. At that time was not a large part of the construction "overhead construction?"

General ALLEN. Yes, sir.

Mr. FITZGERALD. A considerable proportion of that construction has since been put underground?

General ALLEN. Yes, sir.

Mr. FITZGERALD. And the expense of maintaining that is not nearly so great as overhead construction?

General ALLEN. No, sir.

Mr. FITZGERALD. If you only needed 10 per cent with the overhead construction why do you estimate for 10 per cent now?

General ALLEN. We had very few posts then. We still have some overhead construction.

Mr. FITZGERALD. The number of posts would not make any difference since you are figuring on the percentage?

General ALLEN. No, sir; whether in one or many posts.

Mr. SMITH. Was this 5 per cent you speak of 5 per cent of the annual appropriation or 5 per cent of what had been appropriated in the past?

General ALLEN. Five per cent of what we have installed. The amount of money installed is not all the money that is spent. The money spent for the overhead installation was not wasted, but it is money which has been spent for provisional installations which have been replaced.

Mr. FITZGERALD. That has been supplanted by modern construction?

General ALLEN. By modern installation.

Mr. FITZGERALD. Can you take any particular case and give us the amount of money that has been required to install the plant?

General ALLEN. I can give you the average of what it costs to install the plant.

Mr. FITZGERALD. The average would be of very little use since the cost varies so much owing to the condition at the different places?

General ALLEN. The average would be pretty fair.

Mr. FITZGERALD. Could you take some one particular case and give us the amount of money required to install the plant and then how much you have needed each year since the plant was installed to maintain and operate it?

General ALLEN. I can give it to you by the different districts. In the district of Portland we have had allotted \$35,000 and we have obligated \$26,000, and we have left for that place still \$9,000.

Mr. FITZGERALD. That is not what I want.

General ALLEN. We could make up an estimate for any one particular post, but I have not those details with me.

Mr. FITZGERALD. I would like to find out just what the money is spent for under this heading and under the heading of "maintenance and operation." For instance, after these wires are buried, take around New York, outside of the cables across the Narrows, the cables that are in conduits on the land will last how long?

General ALLEN. They ought to last indefinitely.

Mr. FITZGERALD. And the cost of maintaining them is insignificant?

General ALLEN. Yes, sir; very small.

Mr. FITZGERALD. How much money would be required to maintain the instruments at the different places and what other things would the money be spent for?

General ALLEN. For keeping up all the instruments that are at the different posts.

Mr. FITZGERALD. Name some of those instruments.

General ALLEN. Cables, telephones, telautograph instruments, meteorological instruments, switchboards, dynamos, storage batteries, and the entire list of instruments that are used in the work. It is a very elaborate system.

Mr. FITZGERALD. A telephone does not deteriorate very much?

General ALLEN. Yes, sir; they do in seacoast installations and then there are the telautograph instruments and all the electrical instruments.

Mr. FITZGERALD. In my office I have a telephone and it does not cost ten per cent of the installation to maintain it. It costs no more to maintain telephones at Fort Hamilton or Fort Hancock or Fort Wadsworth than right in the heart of Brooklyn?

General ALLEN. Very true, but telephone companies in general have to allow 10 per cent per annum for depreciation of the plant at large. This plant includes telephones, cables, switchboards, dynamos, etc., the same as used in seacoast defenses. The telephone in use in a subscriber's house is a very small part of the plant on which depreciation must be counted. Moreover there is no comparison between depreciation of instruments in houses, and in exposed emplacements and booths on the seacoast such as these telephones, etc., are.

Mr. FITZGERALD. This is about fifteen per cent of the amount of money that has been spent for installation?

General ALLEN. Ten per cent for the material and the labor will cost about 5 per cent.

Mr. FITZGERALD. Previously you allowed five per cent?

General ALLEN. That was an estimate, but we never got through with it.

Mr. FITZGERALD. How much did it take to get through?

General ALLEN. It is almost impossible to tell because it was part of the installation.

Mr. FITZGERALD. There are some places in the United States where the installation has been completed over two years?

General ALLEN. No, sir. It is only in the last half year that any of the larger installations have been entirely completed and turned over, when the maintenance period really begins.

Mr. FITZGERALD. Can not you give us figures from a place like that that would inform us what it will cost to maintain the installation?

General ALLEN. I can give you the figures for any post that you may select.

Mr. FITZGERALD. I would prefer to have you select two or three posts where the installation has been completed for two years and give us what it has cost to operate and maintain it?

General ALLEN. I do not think we have had a place entirely and completely installed for two years.

Mr. FITZGERALD. Then one year.

Mr. SHERLEY. Is not this a guess rather than an estimate based on experience?

General ALLEN. No, sir; we have gone over the things as carefully as we could.

Mr. SHERLEY. According to your estimates within the course of ten years we will pay for maintenance as much as the original cost?

General ALLEN. I think it will cost about per cent to maintain the fire control of the fortifications.

Mr. SHERLEY. Without regard to the labor?

General ALLEN. Yes, sir.

Mr. FITZGERALD. All the other Departments get their estimates down to 1½ to 3 per cent?

General ALLEN. You take a thing like a fortification and it is all cement. Our cable which goes into cement I think would last as long as the fortification. That is solid stuff.

Mr. FITZGERALD. The mechanism of the modern guns is as delicate as any of the instruments you have to take care of, and 3 per cent covers both the material and labor, and that is their outside estimate. These instruments are inside?

General ALLEN. No, sir. There is no comparison, I should say, between the heavy mechanism of guns and fortifications, and the delicate electrical instruments used in fire control work.

Many of the instruments are in booths and in boxes attached to the gun carriages where the deterioration is very rapid.

Mr. FITZGERALD. Take some post which has been completed and which you have been operating and maintaining and give us the amount it costs to install the apparatus and then what it costs to operate and maintain it for a year and then we can arrive at some conclusion ourselves.

General ALLEN. Very well.

Mr. SMITH. What is the oldest completed post?

General ALLEN. I think probably one of the New York posts, Fort Hamilton or Fort Wadsworth.

Mr. SMITH. Do you think with your force at the Department that it may be possible to take one of those posts or both of them, if completed about the same time, and ascertain what the expenses have been in the last year in the way of operation and maintenance at that post?

General ALLEN. Yes, sir; I think we could.

Mr. SMITH. I suggest that you do that and put it into the hearings?

General ALLEN. Yes, sir. I am trying to give you the exact information, but we can not cut the amount below what it will actually cost.

Mr. SMITH. Suppose your telautographs should become antiquated, would you replace the old ones with the latest pattern under this appropriation?

General ALLEN. No, sir; I could not do that. This amount of money would not answer for that purpose. When you change the type of anything I regard that as installation and not as maintenance.

Mr. SHERLEY. You charge that to capital instead of to operating expenses?

General ALLEN. Yes, sir; it is like a betterment.

Mr. SMITH. If the telephone was so modified as to require a different one that would be the same thing?

General ALLEN. Yes, sir; that would be installation, but if the telephone or telautograph should get out of repair the cost would be charged to maintenance.

PURCHASE OR CONSTRUCTION AND TEST OF AIRSHIPS, FLYING MACHINES, ETC.

Mr. SMITH. We will take up the next item, "for the purchase or construction and tests of such types of airships, flying machines, aeroplanes, etc., as may be approved by the Secretary of War, \$200,000?"

General ALLEN. That is recommended by the Secretary because every other nation in the world is doing the same thing. We have not as yet done very much in the matter.

Mr. SMITH. I want to ask you in that connection why it is that the government is undertaking to make these experiments both by your bureau distinctively and by the Board of Ordnance and Fortification?

General ALLEN. The Board of Ordnance and Fortification has a certain amount of money for experiments. They do certain things. We have spent no money out of our own fund except for the free balloons and for the captive balloons. There is an enormous interest all over the country in these flying machines and they concluded that they would spend some little money making experiments. We have made certain specifications and if these people fill the specifications the machines will be purchased. The United States has not spent any money either by the Board of Ordnance and Fortification or my office.

Mr. SMITH. What I wanted to get at was why we should appropriate money directly under your office for these experiments and then appropriate money separately for the Board of Ordnance and Fortification that can be used for these experiments and thus have two heads under which this money can be drawn?

General ALLEN. I think the board did that because there was no other money available at the present time and so in order to get the thing started they said: "We will give a certain amount for experiments."

Mr. SMITH. They appropriated \$50,000 for experiments with the Langley ship?

General ALLEN. Yes, sir.

Mr. SMITH. The Board of Ordnance and Fortification has planned or allotted \$100,000 for this purpose in the years past. They gave \$50,000 for the Langley experiments and now they have given \$46,000 for these new projects which provide for the acquisition of three ships heavier than air machines?

General ALLEN. Yes, sir; if anybody can make them.

Mr. SMITH. They have been made?

General ALLEN. Not this kind. If these people succeed I think the Board will be justified in paying them; if they do not succeed they will not get a cent.

Mr. SMITH. Here is a thing in its infancy, in a sense, and here is a proposition to give \$200,000 direct to the Signal Corps and \$100,000 to the Board of Ordnance and Fortification that can be used for the same purpose. Why ought not what little experimenting we do in this line of airships or aeroplanes be under either the Signal Corps or the Board of Ordnance and Fortification? I can see some reason for either, but no reason for both.

General ALLEN. Of course if we had any money they would not have come in for this purpose.

Mr. SMITH. Why is not that the proper place?

General ALLEN. The Board of Ordnance and Fortification?

Mr. SMITH. Yes, sir.

General ALLEN. It is immaterial to me if it goes there.

Mr. SMITH. Is not this true, that a successful aeroplane at least would be of great value from a military standpoint outside of the Signal Corps?

General ALLEN. Yes, sir; it is for the whole Army.

Mr. SMITH. Every branch of the Army would be interested in the feature?

General ALLEN. Yes, sir. The only reason that we took it up was that the Signal Corps had been doing all the balloon work that had been done.

Mr. SMITH. Would you not regard the progress of last year of paying \$46,000 to get three of these machines under way fast enough to proceed with an experiment of this kind?

General ALLEN. It provides nothing for the dirigible balloons which in my own mind are the real thing, because they already exist. Every Army in the world is making the experiment, England, France and Germany. The flying machine men do not know whether they are going to succeed.

Mr. SMITH. How many balloons have you?

General ALLEN. We have a few balloons, two or three of the free balloons by which you can sail around in the air and one captive balloon which is held on a string.

Mr. SMITH. How many balloons would this \$200,000 probably acquire?

General ALLEN. The first machine cost anywhere from \$50,000 to \$60,000. Whether we could build one for that amount, I do not know; probably just about that amount.

Mr. SMITH. Was it your idea to provide for three of these balloons?

General ALLEN. Possibly four.

Mr. FITZGERALD. This whole matter is yet largely in an experimental state?

General ALLEN. Yes, sir; but we know what has been done abroad. There is the *La Patrie* in Paris, which made frequent voyages of 175 miles and return and carried four or five people.

Mr. FITZGERALD. Are not the conditions on the continent of Europe such as to necessitate, perhaps, more expensive investments in these balloons than in this country?

General ALLEN. Yes, sir; especially between France and Germany, because they have a very definite problem; the defense of the frontier between the two countries.

Mr. SMITH. Why should not all this be done either under the Signal Corps or under the Board of Ordnance and Fortification, why should it be divided?

General ALLEN. That is perfectly immaterial, as far as we are concerned, except the Board of Ordnance only allot for experimental work, and do not purchase for supply.

Mr. FITZGERALD. Would it not be wise to wait until it has been determined that there is a ship that would be of advantage to the Army before appropriating money to acquire a number of them?

General ALLEN. We know that we can buy a dirigible balloon or make one; we do not have to go any farther. Other people have made them and they can be purchased.

Mr. FITZGERALD. How long does it take to build one of these ships?

General ALLEN. We issued specifications some time since. Bidders wanted from five to six months to build a dirigible, a very small

affair, and the lowest bidder asked seven thousand dollars for it. That would be a dirigible to carry two men and within its limitations would probably be very useful. We ought to have a dirigible that can go forty miles an hour. The small machine can only go up in very good weather and you can not get the speed out of it. The idea was to get some of the small ones and train the men to go up in the air. If we should start in and build a large dirigible balloon we would have to spend \$50,000 or \$60,000.

Mr. SMITH. As I understood you other nations have them?

General ALLEN. Yes, sir; France and Germany and Russia are building them.

Mr. FITZGERALD. Has Great Britain any of them?

General ALLEN. She had one, a small one, but it did not turn out very well. The French ships are about the best.

Mr. FITZGERALD. Is not the success of France and Germany due largely to the fact that the ships would be of more value to them than to other nations?

General ALLEN. It is due to the fact that they have spent a lot of money. The conditions have compelled them to spend the money and by spending the money they have gotten the machines. We have spent nothing so far.

FIRE-CONTROL STATIONS AND ACCESSORIES.

Mr. SMITH. Please turn back to page three of the bill, where there is the item, "For construction of fire-control stations and accessories," and it is stated in the note, "This estimate is that made by the National Coast Defense Board for completing the fire-control installations of the following harbors: Narragansett harbor, \$616,861; Eastern Entrance to Long Island Sound, \$762,775; Hampton Roads, \$306,114." Do you know how much of this estimate, so far as your branch is concerned, is for Narragansett Harbor?

General ALLEN. \$136,800 for Narragansett Bay; \$185,900 for the Eastern Entrance to Long Island Sound; and \$89,600 for Hampton Roads.

Mr. SMITH. Before leaving continental United States, in the Urgent Deficiency bill you sought to obtain \$100,000 for your branch of this service?

General ALLEN. Yes, sir.

Mr. SMITH. What was that for?

General ALLEN. To complete the work following that already in hand by the Engineers and Ordnance in Manila and Subig Bays. A year ago there was \$100,000 appropriated for fire control in insular possessions. They gave the Engineers \$75,000 and gave me \$25,000. This \$25,000 was spent entirely for material and it was estimated that it cost an additional \$100,000 for material and labor to complete the work.

Mr. SMITH. In the insular possessions?

General ALLEN. Yes, sir; for Naval stations. We spent the \$25,000 for material. The other people had money to go on with their work, but when it came to our part we expended the \$25,000 and can go no further without more money. I thought the Com-

mittee understood that it was simply because we did not have enough money.

Mr. FITZGERALD. That was the fault of the Department rather than Congress?

General ALLEN. Yes, sir; it was not the fault of Congress. It was simply that when they apportioned the money they gave the Engineers so much and they gave us \$25,000 out of the amount with which we bought the material.

Mr. SMITH. It used to be the practice of this Committee to report so much for the Ordnance Department, so much for the Engineers, and so much for the Signal Corps in this fire-control system?

General ALLEN. Yes, sir.

Mr. SMITH. It was not upon the initiative of the Committee, but upon the initiative of the War Department that that system was abolished, because it was explained that the Committee did not succeed in wisely balancing the items. That having been done for that reason we must either take the responsibility or leave it upon the War Department?

General ALLEN. Yes, sir.

Mr. SMITH. Whenever we make an appropriation we make it as requested by the War Department *en bloc* for the different branches of the service, and I personally would not be willing to make an appropriation now for the fire-control system for a single branch. If we make an appropriation this year for the fire-control system in the insular possessions and you do not get a sufficient amount it is the fault of the War Department and not ours?

General ALLEN. Certainly. We have to take what we get. They are responsible to you, there is no question about that.

Mr. SMITH. There is nothing to prevent you from getting in this year's appropriation the great preponderance of the money?

General ALLEN. Not if they assign it. We make the estimates and when the appropriation is made if they do not give the money to us we can not do the work.

Mr. SMITH. Was this caused by the fact that they felt the other work had to be done first?

General ALLEN. Yes, sir; we could not put ours in unless they did their work.

FIRE CONTROL—INSULAR POSSESSIONS.

Mr. SMITH. Turning to page 23 we come to the item of fire control in the insular possessions. Now where is this work designed to be done?

General ALLEN. It began originally at Subig Bay, but I think that has been largely abandoned there, and they are now going to Manila. The fire-control material that we bought will be good for one place or the other.

Mr. SMITH. Do you know how much money they spent at Subig Bay?

General ALLEN. I can not say.

Mr. SHERLEY. Has your department expended any money at Subig Bay?

General ALLEN. Only for material.

Mr. SMITH. What would be your share of the amount necessary to complete the fire-control system at Subig Bay upon the theory

that no additional fortifications except those already in course of construction are placed there?

General ALLEN. As nearly as I can tell you for Subig Bay alone about \$15,000.

Mr. SMITH. We want to know how much will be necessary for the Signal Corp's share of the fire-control system with the present plan of defense for Subig Bay, and in addition to that, what you have already received.

General ALLEN. As stated above for Subig Bay alone about \$15,000.

Mr. FITZGERALD. How much will your corps require to complete the fire-control system?

General ALLEN. I will furnish that information.

Mr. SMITH. I wish you would let us know now, if you can, what is your share of this estimate of \$280,660 for Guantanamo?

General ALLEN. \$49,300.

Mr. SMITH. Now, in this estimate there is \$561,086 for Manila Bay?

General ALLEN. Yes, sir.

Mr. SMITH. That, I take it, includes the balance of the fire-control plan for the whole Taft Board scheme?

General ALLEN. I understand those figures you are giving me are the Taft Board figures. I took them right from that estimate.

Mr. SMITH. Now, assuming that in the progress that we will probably make in the next year we will not allow anything for the fortifications at Manila except perhaps the completion of Corregidor Island fortifications and Carabao Island, will you tell us what would be the amount necessary to complete the Signal Corps share of the fire control for those two points?

General ALLEN. Based on what the War Department has decided to put in, or what you are going to appropriate?

Mr. SMITH. On what the War Department has decided to put in at Carabao and Corregidor. Can you give that to us, or will you want to furnish that later?

General ALLEN. I will have to look that over. It is an entirely different estimate. I do not know what they have decided to put in.

Mr. FITZGERALD. You have based your estimate on the Taft Board estimate?

General ALLEN. Yes, sir.

Mr. FITZGERALD. What we want to know is what would be the expense for your branch of the islands that we have fortified.

General ALLEN. When you appropriate this money, you probably will not see these items in there. It probably will be a lump sum for certain things, and it will be divided as above. They will give what they think best out of the amount of money, so that I do not think that they will know themselves just how much they will want for each of these things. As far as I am concerned, if you make a lump sum appropriation the Signal Corps will get its share.

Mr. SHERLEY. We can not allow a lump sum without knowing what your share ought to be.

Mr. FITZGERALD. For Carabao Island you want so much money, and at another place you want so much. We want the figures which it is estimated your corps will require for the work at these different points. We have them for the other points.

Mr. SMITH. We do not intend to put any items in for you. We are simply trying to get the items to add up.

General ALLEN. My items are a certain per cent of what they do.

Mr. SMITH. The Engineers say they have all they want. If we allow money for Subig Bay we want to allow money for your work only for what we have there. Inasmuch as the engineers have all the money for Subig Bay, all we have to do is to provide for the Ordnance and the Signal Corps. We will put in a lump sum, but we want to know what it will be. I wish you would ascertain also and fill in at this point in your notes the amount necessary for the Signal Corps part of the fire control on Corregidor and Carabao Islands separately.

General ALLEN. This estimate will be furnished as soon as it can be made up. [See page 197.]

Mr. SMITH. I wish you would also fill in a statement of how much will be necessary for the Signal Corps share of the fire control at Pearl Harbor, giving separately what will be necessary if only the two 12-inch guns are emplaced there, and what additional sum will be necessary if the contemplated mortars are installed at the entrance to Pearl Channel.

I wish you would also ascertain and fill in the Signal Corps portion of the expense of installing the fire control for the two 14-inch guns contemplated at Honolulu, and separately for the mortar battery at Diamond Head. That will enable us to see how much fire control we ought to provide for.

This estimate will also be furnished in detail. [See page 197.]

QUARTERMASTER-GENERAL'S OFFICE.

STATEMENT OF BRIG. GEN. J. B. ALESHIRE, QUARTERMASTER-GENERAL, U. S. A.

TORPEDO PLANTERS.

Mr. SMITH. The only item in this bill that you would be specially advised upon by reason of your duties is the item on page 21, "For the procurement of four torpedo planters, one for use on the Pacific coast, one each for Manila and Subig Bay, Philippine Islands, and one for the Hawaiian Islands." How many torpedo planters have you now on the Pacific coast?

General ALESHIRE. We have not any on the Pacific coast, but we have advertised for the construction of one to be used on the Pacific coast.

Mr. SMITH. That was authorized a year ago?

General ALESHIRE. Yes, sir. The idea, as I understand it from the Chief of Artillery, is to use one of these torpedo planters, perhaps the one we are now constructing, at the mouth of the Columbia river and posts in that vicinity; the other one to be used at San Francisco and for points south of San Francisco.

Mr. SMITH. Why do you ask for one each for Manila and Subig Bay when you only have proposals in for two for the entire Pacific coast? Why can not one entirely adequately look after Subig Bay and Manila?

General ALESHIRE. Mr. Chairman, you will have to excuse me about that. We do just as the Chief of Artillery asks us to do. He makes the plans and they are approved by the Secretary and we are asked to submit the estimates and when the appropriation is made we construct the boats.

Mr. SMITH. You do have charge of the construction of the boats?

General ALESHIRE. Yes, sir.

Mr. SMITH. What is the proposed cost of each of these torpedo planters?

General ALESHIRE. \$175,000.

Mr. SMITH. Is that the cost of the torpedo planters you have recently constructed?

General ALESHIRE. Yes, sir.

Mr. SMITH. How many torpedo planters have you on the Atlantic coast?

General ALESHIRE. Four. We have but four torpedo planters in commission now.

Mr. SMITH. How long has it been since you put the first torpedo planter into commission?

General ALESHIRE. I believe it was in 1905.

Mr. SMITH. In any event the use of distinctive boats as torpedo planters has been very recent?

General ALESHIRE. Yes, sir; I think it is quite recent.

Mr. SMITH. At the time of the Spanish war all the torpedos on both coasts were laid by ordinary vessels?

General ALESHIRE. I think they were. Of course the committee will understand that I am not in touch with the details that pertain to the Coast Artillery service. I am not familiar with all those details, but about the construction of the boat I can answer any question. The first reference to any torpedo planters in any annual report was the report of General Humphrey for 1905, and I recall seeing a communication in the office dated in the spring of 1904 on the subject of boats for the Coast Artillery. I think that is about the time they were first constructed.

Mr. SMITH. You first constructed them out of the Army transportation appropriation without any special appropriation?

General ALESHIRE. I am not certain about that.

Mr. SMITH. My impression is that all the Atlantic coast vessels were constructed out of "Transportation of the Army." What are the launches that are wanted in the Philippine Islands and in the Hawaiian Islands?

General ALESHIRE. That is a small launch, 30 feet long, and I understand they are for use in connection with the mine planting work.

Mr. SMITH. Aside from the mere question of what these would cost we must go to the Chief of Artillery?

General ALESHIRE. Yes, sir.

Mr. FITZGERALD. How much do the launches cost?

General ALESHIRE. \$3,000 apiece. The boats are pretty good boats; they carry quite a good crew. There is a small launch carried on each one of these torpedo planters to carry out the system of mine planting which they have adopted.

Mr. SMITH. They propose to have four launches at Manila and only one torpedo planter there. They are not all carried on the planter?

General ALESHIRE. No, sir; not the launches referred to there. The torpedo planter is equipped with a little launch for its use in connection with the mine planting, but these small launches are in addition to the launch which the torpedo planter carries.

Mr. SMITH. And you estimate for them at \$3,000 apiece?

General ALESHIRE. Yes, sir.

Mr. SMITH. And there are nine of them?

General ALESHIRE. Yes, sir.

THURSDAY, *February 20, 1908.*

SUB-MARINE MINES AND ARTILLERY.

STATEMENT OF BRIG. GEN. ARTHUR MURRAY, CHIEF OF ARTILLERY, ACCOMPANIED BY CAPT. JOHNSON HAGOOD, CAPT. R. E. CALLAN, AND CAPT. STANLEY D. EMBICK, ASSISTANTS.

CONSTRUCTION OF FIRE-CONTROL STATIONS AND ACCESSORIES.

Mr. SMITH. The first page on which your items appear, General, is page 3. You state in the note to this item on page 3 that this proposed appropriation is for Narragansett Harbor, the eastern entrance to Long Island Sound, and Hampton Roads?

General MURRAY. Yes, sir.

Mr. SMITH. Some one has suggested striking out the words "operation and maintenance" from this item, and the estimate is here for the operation and maintenance under the Signal Corps.

General MURRAY. Yes, sir. That is a separate item for operation and maintenance of so much of the fire control as is installed by the Signal Corps. It does not mean the operation of the fire control by the men who operate the system in our artillery drill and practice. It is simply for maintaining that part which deteriorates year after year—that part which is installed by the Signal Corps.

Mr. SMITH. Suppose we adopted this suggestion and struck out "operation and maintenance" here, and gave the Signal Corps for operation and maintenance as suggested by the Department: Where, then, will the money come from for the maintenance of the Engineers' part of this work?

General MURRAY. I think they take that from their general appropriation. They have an estimate here somewhere for \$300,000, I think, for the maintenance and repair of fortifications, and they take their part from that estimate.

Mr. SMITH. Do you understand that has been the practice in the past, for them to take their part of the maintenance of fire control from their general appropriation for fortifications?

Captain HAGOOD. The amount which has been required by the Engineers for maintenance has been practically negligible, because their part of the work is the buildings, ducts, and so on, and when money has been allotted to them for construction in these different harbors they have always had enough to put in any little repairs what may be necessary. But the Signal Corps has no other appropriation of any kind in connection with this seacoast defense, and therefore when they put in cables, and lines of communication, and so forth, it is necessary that they should have something for maintenance. Up to this time they have taken each year a certain amount from the fire-control appropriation for maintenance. It has been a drain on the appropriation, and the Secretary of War and the others concerned are anxious that the question of maintenance should be entirely separated from the original cost of installation.

Mr. SMITH. But you gentlemen do not understand my question. Perhaps General Murray does. It is true that heretofore your own branches of the service could take from this appropriation for maintenance. If you struck out "operation and maintenance" the Engineer Corps can never get it in from this item for the painting of buildings, and so forth.

General MURRAY. So far as I know, they have not, and so far as I know the Ordnance have not.

Mr. SMITH. Is not that largely due to the fact, General, that this being a brand new service, the permanent buildings have required no painting until now?

General MURRAY. That is correct, but at the same time I do not think maintenance and original installation should be confused.

Mr. SMITH. They have nothing elsewhere for it?

General MURRAY. I think you will find that the Engineers have asked an appropriation for repair and maintenance of fortifications. Now the fire-control stations are simply a part of the fortifications, and I think it would be very proper for them to take the money out from that appropriation, and not to take it from what we are getting to put in new work.

Mr. SMITH. It occurs to me whether this was not done in a conference with the Engineers.

General MURRAY. This was done after a conference between the Engineers, the Ordnance, and the Signal Corps, all combined.

FIRE-CONTROL SYSTEM—WHERE INSTALLED.

Mr. SMITH. Now what is the present state of the fire-control system in Narragansett Harbor?

General MURRAY. We have installed there what is called a temporary system, in which some of the instruments that we would use in the standard system are now included, and this estimate is to bring up that temporary system, which we have for daily target practice, and make it a standard system. A standard system has been installed, from amounts appropriated heretofore, in Portland, Boston, New York, Puget Sound, and San Francisco. In the last two named places it has not been completed yet; the work has not yet been completed. It has practically been completed in the first three—Portland, Boston, and New York. But they have money sufficient to complete, practically complete, that for San Francisco and Puget Sound, so far as relates to guns that are now installed. As you know, the Taft Board proposed certain additional armament for these places, and there will be required a certain amount of money for the fire control for those additional guns whenever they are appropriated for and installed.

Mr. SMITH. Now if Congress was unwilling to give you all the amount asked for this year, which of these three points would you regard as the most emergent?

General MURRAY. That brings up, you might say, the point as to what is the most desirable in the United States, whether these three points or any others. At the time this estimate was put in the idea was to complete the fortified places of most importance, regardless of whether they were on the East coast or the West coast. Under existing conditions it is questionable whether we should not complete first the fortifications on the West coast rather than on the East.

Mr. SMITH. What is lacking on the West coast, now, of any importance?

General MURRAY. I have prepared here some blueprints which will show just exactly to the members of the Committee what is lacking in each place of the four fortified places on Puget Sound in all that relates to fortifications. [Submits blueprints.]

Fortifications for Pacific coast.

Locality.	Guns, carriages, and emplacements.								Cost.		Ammuni- tion.	
	Caliber.								Sites and emplace- ments.	Guns and carriages.		Total.
	14- inch.	12- inch.	10- inch.	8- inch.	6- inch.	5- inch.	3- inch.	12- inch M.				
PUGET SOUND.												
Projected, National Coast Defense Board.....	7	6	18	3	27	8	24	48			\$3,598,100	
Constructed or under construction.....		4	18	3	20	8	20	40			2,806,480	
Remaining.....	7	2			7		4	8	\$1,985,700	\$1,427,900	701,620	
Estimated for 1909.....	3	2			7		4		a 48,500 1,135,000	747,900	90,300	
Not asked for.....	4							8	860,700	680,000	611,320	
COLUMBIA RIVER.												
Projected, National Coast Defense Board.....			8	3	11		6	16			1,122,000	
Constructed or under construction.....			8	3	11		6	8			887,600	
Remaining.....									120,000	152,000	224,400	
Estimated for 1909.....											31,500	
Not asked for.....								8	120,000	152,000	192,900	
SAN FRANCISCO.												
Projected, National Coast Defense Board.....		20	5	8	14	9	24	56			3,786,825	
Constructed or under construction.....		18	5	8	14	9	16	56			3,029,460	
Remaining.....		2					8		222,670	216,930	439,600	
Estimated for 1909.....									a 250,000 222,670	a 250,000	757,365	
Not asked for.....		2					8			216,930	677,565	
San Diego.....												
Projected, National Coast Defense Board.....			4			2	4				103,250	
Constructed or under construction.....			4			2	4				82,600	
Remaining.....											20,650	
Estimated for 1909.....											8,400	
Not asked for.....											12,250	
Total required to complete Pacific coast.....									2,626,870	1,796,830	1,704,035	
Total estimate (1909) for Pacific coast.....									1,433,500	747,900	210,000	
Total remaining, not asked for.....									1,193,370	1,048,930	2,242,300	
											1,494,035	

a Site.

Locality.	Submarine mines.		Searchlights.			Power plants.	Fire control.	Other items.	Total.
			Number.	Cost.					
				36-inch.	60-inch.				
PUGET SOUND.									
Projected, National Coast Defense Board.	5 grand groups.		7	20		\$518,952	\$1,099,825		
Constructed or under construction.			1				(c)		
Remaining.....	\$13,800	\$19,150	6	20		\$394,000	360,659		\$175,000
Estimated for 1909.....	13,800	19,150	6	20		394,000		{ \$175,000	2,685,047
Not asked for.....						283,448	360,659	{ \$12,949	2,788,183
						285,504			
COLUMBIA RIVER.									
Projected, National Coast Defense Board.....	7 grand groups.		4	5		220,747	270,256		
Constructed or under construction.							(d)		
Remaining.....	30,400	29,250	4	5		121,000	270,256		152,512
Estimated for 1909.....	30,400	29,250						{ \$61,362	1,076,993
Not asked for.....			4	5		121,000	270,256		
SAN FRANCISCO.									
Projected, National Coast Defense Board.....	14 grand groups.		5	13		528,016	1,473,991		
Constructed or under construction.			1				(e)		
Remaining.....	102,000	56,300	4	13		257,000	84,000		
Estimated for 1909.....	102,000	56,300	4	13		257,000		{ \$4,430	1,043,935
Not asked for.....						233,611	84,000		1,434,776
San Diego.									
Projected, National Coast Defense Board.....	4 grand groups.		1	3		31,028	99,635		
Constructed or under construction.							(e)		
Remaining.....	86,314	15,750	1	3		60,000	99,635		110,464
Estimated for 1909.....	86,314	15,750							202,913
Not asked for.....			1	3		60,000	99,635		
Total required to complete Pacific coast.	232,514	120,450				832,000	814,550	253,741	9,679,733
Total estimate (1909) for Pacific coast.....	232,514	120,450				651,000		253,741	4,176,958
Total remaining, not asked for.....						181,000	770,890	814,550	5,502,775

^a To complete existing defenses.

^b Torpedo planter.

^c Modernizing old emplacements.

^d Improvised system.

^e Model, old emplacement.

* Model, old emplacement.

c Modernizing old emplacements.

a To complete existing defenses.

b Torpedo planter.

d Improvised system.

Mr. SMITH. I thought you had all the money allotted for the completion of the fire control at Puget Sound.

General MURRAY. We have.

Mr. GRAFF. It says, "Remaining, \$360,000; and not asked for, \$360,000." That would indicate that they have asked for all they need.

General MURRAY. We got from you last year all that was required to complete everything that has been installed at Puget Sound. The Taft Board proposed additional armament for Puget Sound and in order to get the fire-control system for those guns, we have got to have the additional funds indicated in the table. This corresponds to the guns that were added by the Taft Board. That is, if they put up new guns, we have got to add more fire control.

Mr. SMITH. Don't you regard Puget Sound as pretty well fortified now—not perhaps ideally fortified, but pretty well fortified?

General MURRAY. It is a question of what "pretty well fortified" means. Undoubtedly it might be so classed, but to make it what I believe it should be, it would be better to add the guns that have been projected by the Taft Board.

Mr. SMITH. You might say that of almost any increase of the defense.

General MURRAY. I do not believe we would be approximately over-fortified if we had those guns.

Mr. SMITH. Have we not already got all the guns recommended by the Endicott Board?

General MURRAY. I can not answer that. I would have to look back so as to see. I do not know whether there has been or not. It is possible that that may be so. But this last Board, when they considered the question of defenses, considered it for each harbor, and added or subtracted to bring the defenses up to an adequate defense, what in their judgment they considered an adequate defense.

Mr. GILLET. Is it not the natural tendency of anybody on whom the responsibility of fortifying a place falls to overfortify?

General MURRAY. I think not.

Mr. GILLET. I suppose you are responsible, and perhaps you would be apt to think, "If ever we are not sufficiently fortified we will be held responsible for what may happen, and therefore we will overfortify in order to avoid that."

General MURRAY. I speak for myself, because for a number of years I was a member of the Board of Engineers which had the devising of the project before the Taft Board was organized, and I think in almost every instance where a project came up, that is, a comparison of past projects with the projects that were to be gotten up by myself, I not only voted for a reduction, but for a considerable reduction. I recognize that as we improve in our guns and mine defenses there is less and less liability to attacks by a foreign navy upon our fortifications. At the time I mention our defenses were not as good as they are now, and I think at the present time, so far as I am concerned, I am inclined to underfortify rather than to overfortify, for the reason that I am especially interested and concerned in the question of where we are going to get the troops to man these fortifications. I am also a strong advocate of finishing up existing fortifications, by providing the necessary fire control, electric power,

light, and searchlights, and leaving the question of additional gun defenses to a subsequent day.

Mr. SMITH. Now, General, to make a general question cover all these Pacific coast points, is there any point of these four on the Pacific coast where the permanent fire control is not either already fully installed or already fully provided for, for all the guns and fortifications that have been authorized by Congress?

General MURRAY. There are two such points.

Mr. SMITH. Which are they?

General MURRAY. Columbia River and San Diego Harbor.

Mr. SMITH. How much will it be necessary to appropriate for the mouth of Columbia River to complete the fire control for the existing fortifications or those already appropriated for?

General MURRAY. Two hundred and seventy thousand two hundred and fifty-six dollars. It is given on the column of the blueprint there—

Mr. SMITH. Under the heading "Not asked for." Now you have that marked up on this list you gave us as an improvised system.

General MURRAY. We have now an improvised system installed. That is a temporary system at that place.

Mr. SMITH. Have you nothing in the way of permanent fire control at the mouth of the Columbia River?

General MURRAY. Nothing has been put in there in the way of permanent fire control at all. As I told you at the beginning, the same instruments in the improvised system would be used in the permanent system.

Mr. SMITH. You have no conduits under ground, and no observation stations?

Captain HAGOOD. We have no underground conduits. We have some more or less permanent stations. The plan contemplates adapting the improvised system to the standard as far as is practicable. This is worked out to put them all on the permanent or standard basis, and the amount indicated \$270,256 is necessary to convert the improvised system to the standard or permanent system.

General MURRAY. The available improvised system has been subtracted from the total that would be required to put in the permanent system.

Mr. SMITH. Do I understand you now that you regard as first in importance, then, as you always did, on the Atlantic Coast the Eastern Entrance of Long Island?

General MURRAY. The Eastern Entrance of Long Island, as one of the lines of defense for New York.

Captain HAGOOD. I might say to the Committee that some years ago, when this question was first being taken in a systematic way, the Secretary of War laid out a definite program for the installation of fire control. Under this program the harbors were to be taken up in the order of their commercial and strategic importance. They were placed on the program in the following order: New York, Boston, Portland, San Francisco, Puget Sound, Eastern Entrance to Long Island Sound, Hampton Roads and Narragansett Bay. Subsequently San Francisco was placed below Puget Sound on account of the earthquake, which interfered with the progress of the work. This program has been followed until now we are ready to go ahead

with the Eastern Entrance to Long Island Sound, Hampton Roads and Narragansett Bay as soon as we get the money.

Mr. SMITH. But now suppose we were going to give you something for the Pacific coast corresponding to your figures, and something for the Atlantic. Which is the first place in order of importance, do I understand, on the Atlantic?

General MURRAY. I would still put the Eastern Entrance of Long Island Sound first.

Mr. SMITH. Is all this amount estimated for the eastern entrance of Long Island Sound required for the existing fortifications there, or are these contemplated fortifications on Fisher's Island and adjacent thereto?

Captain HAGOOD. That figure in there is for the whole, and there is about one-third of it for the new defenses.

Mr. SMITH. About two-thirds of this then, would be all that could be utilized unless you get extra guns?

Captain HAGOOD. Yes, sir.

Mr. SMITH. And even if you got extra guns you would have no use for the money this year?

Captain HAGOOD. Yes, because we would put them all in together. It is very bad policy to build first one and then another and therefore we now try to get them in at the same time.

Mr. SMITH. If we gave you two-thirds, that is all that could be of practical utility next year?

General MURRAY. If you gave us extra guns you should increase the fire control in the same way.

Captain HAGOOD. I would like to invite the attention of the Committee to the fact that we have been getting for the last three or four years lump sums of \$1,000,000, \$700,000, and \$900,000 for this fire control installation without regard to the amount required for any particular place, and we have been putting in as much as we could to one harbor and then going on to the next on the programme. If this total amount estimated for New London Harbor, \$762,000, should be given, the way in which the work would be carried on is that they would put in as much as they could in New London Harbor and then go on to the next place. The purchase of cable, and so on, is made in very large lots and must be made in advance, so that we could well use any money left over to make preparations for taking up the next place on the programme. That is the way we have done each year.

Mr. SMITH. You say that Boston comes next in this list?

General MURRAY. No, not Boston.

Mr. SMITH. I mean Narragansett, after Long Island; and Hampton Roads last in the order of importance.

General MURRAY. Yes.

Mr. GILLETT. Does that include the new project at Hampton Roads?

General MURRAY. No. That does not include the new project. Considering this programme as the order of importance in which the fire control system would be installed in these places, which as Captain Hagood told you, was arranged several years ago, before I came into office, the order was, I believe, Narragansett and Hampton Roads. I would say now, if there was a question between the two places, considering the fact that our whole Artillery School is concentrated at Fort Monroe, it would be better, all things considered,

to first put in a standard system at Fort Monroe, and then at Naragansett. That is just a question of relative importance with respect to the work required.

Mr. SMITH. Have you moved your school from Fort Totten down there?

General MURRAY. We will move it next year. I have asked that the appropriation be made to cover the work of the combined schools at Fort Monroe.

Mr. SMITH. Now you have already stated that the fire control for the existing armament of existing fortifications is complete at Puget Sound and at San Francisco, or at least will be complete with the present allotment, and that it will take \$270,256 to complete it for the mouth of the Columbia River?

General MURRAY. Yes.

Mr. SMITH. Now that leaves on the Pacific Coast San Diego——

General MURRAY. Yes——

Mr. SMITH. Where you estimate it will cost \$99,635 to complete?

General MURRAY. Yes.

Mr. SMITH. Is that limited to the existing armament of fortifications there?

General MURRAY. Yes, because there is nothing new projected for that place by the Taft Board.

Mr. SMITH. As a matter of fact, the bar of San Diego is such that no battle ship could get up to San Diego, could it?

General MURRAY. That is a question I would rather have a naval officer answer.

Mr. FITZGERALD. There is 17 and 19 feet of water there. If there were only 19 feet——

General MURRAY. In that case no battle ship could go in; only a cruiser. It is a tortuous channel, and I do not believe it would be possible to get a battle ship in there, practically. Upon consulting a coast survey chart it appears that there is 28 feet at low water, but the channel is narrow.

Mr. SMITH. Of course you and your predecessors have often explained the matter to this Committee, but this improvised system is fairly serviceable unless some accident happens to it? For instance, unless some accident happens to your overhead wires?

General MURRAY. Yes.

Mr. SMITH. The principle is the same in both systems, but in the permanent system you put the wires in conduits and make more permanent installations?

General MURRAY. Yes. Captain Hagood is very conversant with both systems, and I would prefer that he talk to you on that subject.

Captain HAGOOD. There is this difference, which is more important than the one that the Chairman has just mentioned, and that is this, that the improvised systems were put in with the idea of providing drill facilities for all the companies of Coast Artillery, and therefore we have limited the improvised systems to the batteries to which companies are actually assigned. For instance, in San Diego Harbor they only have two batteries out there equipped with the improvised system, whereas they should have four batteries equipped. In other words, only half of it has been put in.

Mr. SMITH. Are these batteries of the same size and weight of guns?

Captain HAGOOD. That depends somewhat on local conditions as to what particular batteries have been put in commission, as we call it.

Mr. SMITH. I am asking you if the batteries at San Diego are all of the same caliber guns?

Captain HAGOOD. No. There are two ten-inch batteries, one four-inch and one five-inch. Without looking up the records I can not say positively, but I should say that one of the ten-inch batteries and one of the rapid-fire batteries have been equipped. But that condition obtains to a more marked extent in some of the larger places. For instance, at Narragansett Harbor; not more than 30 per cent of the batteries have been given even the improvised system.

Mr. SMITH. At San Diego how long would it take to complete the improvised system in case of an emergency?

Captain HAGOOD. If the Signal Corps had the cables and so on, or purchased them and put in the improvised system under great rush orders, I suppose it could be done in two or three months. But a great deal of the equipment has not been manufactured. For instance, the range finders and so on have not been manufactured, and it takes under ordinary conditions a year or 15 months to manufacture the equipment.

Mr. SMITH. But the Signal Corps in fact has equipment on hand all the time, has it not, in preparation for some places, so that if there is only a single place it could be changed?

Captain HAGOOD. Yes; but at the present time they have let their contracts for the necessary cables, and so on, for San Francisco and Puget Sound, and they have no other equipment on hand unless they actually take it up out of the water and carry it out there from the East.

Mr. FITZGERALD. In case of an emergency could not the cables used for commercial purposes be utilized in this system?

Captain HAGOOD. I suppose so, depending on the extent or character of the emergency.

Mr. FITZGERALD. If it became very urgent that we should install an improvised system at some point, could not the material on hand, perhaps in the possession of the different telephone and telegraph companies, be utilized for that purpose?

Captain HAGOOD. Yes.

Mr. FITZGERALD. So that this difficulty of waiting for its manufacture really would not exist?

General MURRAY. It does so far as relates to observation instruments, which are not in the market, and it takes a long time to get those instruments or anything connected with them.

Mr. SHERLEY. How long does it take to manufacture those, General?

General MURRAY. I do not think they can get them in less than a year.

Captain HAGOOD. It customarily takes a year after the contracts are given out. For instance, under the last contract for instruments, the makers are delivering them at the rate of five per month, after a certain length of time has elapsed for the first ones.

Mr. GILLET. What are those?

General MURRAY. The range-finders and plotting boards.

Mr. GRAFF. Are these instruments patented instruments, and made by just a single manufacturer?

General MURRAY. They are made by a single firm as a rule. The way that we decide what the instruments shall be is, when we want a given number of instruments, to have instituted a competitive test of all instruments of that class. We have just had such a test, for depression range-finders, vertical base or depression range-finders, in which four parties competed, and the best one of the four was selected for the type for a number of instruments that we wanted at the present time.

Mr. GRAFF. There are a number of types of each?

General MURRAY. Yes, from time to time, as improvements go on, we try every time to get money for new instruments. We try to bring the type right up to date and institute a new competition, and then go ahead from that.

Mr. SHERLEY. I presume from your statement that frequent changes are made in the perfection of these instruments?

General MURRAY. They are working on them all the time. Even the outside parties who do not get a contract undertake to perfect their instruments, so that when the next contract comes along they will have a chance to get their instruments in on that competition.

Mr. GILLET. You spoke a couple of times about the defenses of New London. Are you still fortifying New London? Do not the defenses at the eastern end of Long Island protect New London?

General MURRAY. They ordinarily say "New London" when they mean the defenses at the Eastern Entrance of Long Island. It is the name of the Artillery district which includes those defenses.

Mr. GILLET. I wondered if you were fortifying those small cities at the same time.

[At this point Representative Thomas, of North Carolina, appeared and made an address to the Committee in behalf of the fortification of Fort Macon.]

Mr. SMITH. General, how much did it cost to fortify Wilmington, North Carolina?

General MURRAY. It cost from three to four million dollars to fortify Fort Caswell. I include in that not only the fortifications, but the guns and the mines and the barracks and quarters. And then another thing you gentlemen must consider: As soon as you add more forts you must consider more troops and the constant pay for them.

SUPPLYING CURRENT FOR POWER AND LIGHTING AT SEACOAST FORTIFICATIONS.

Mr. SMITH. Now we will pass to the next item, "For supplying current for power and lighting at seacoast fortifications, one million dollars." This seems to be about 20 per cent of the general estimate of the Taft Board. That is at the bottom of page 3. What is the emergent necessity for this? All the existing fortifications are equipped with electric plants, more or less modern, are they not?

General MURRAY. I do not think so. They are equipped with a plant for doing some part of the work that is required here, but as to whether they are modern or not, the Engineers would be better able to answer than I. In almost all of our emplacements they have some type of plant that was put in for the purpose of lighting the battery. Current is now wanted for other purposes in addition.

These needs have developed since the question of lighting began. They are for search lights and ammunition hoists and retraction motors, which developed after these smaller plants were put in, and have been provided for heretofore from the general appropriation for gun and mortar batteries. The Taft Board for the first time considered all the batteries of the country and got from the Engineer Corps estimates of what was wanted to supply the proper power for all fortification purposes, and this estimate was made by the Taft Board. Of course I could get the detailed estimates showing them for each place. This was simply their estimate, made by the Engineers at the time, and submitted to the Taft Board, and approved by that Board. It was assumed that we could complete it in five years at that rate.

Mr. SMITH. This Taft Board estimate was a general estimate, made up, of course, of detailed estimates, to bring the electrical equipment up to the ideal system then existing at that time. Is there any information we can get as to how much will be required to meet the conditions there? Is this equipment so radically defective now as to be practically inefficient?

General MURRAY. No. I do not mean that. The present power plants are capable of supplying only a part of the power that is required.

Mr. SMITH. Have you information as to the places where the plant is now practically inefficient?

General MURRAY. There is no place where I would say that it is practically inefficient. It is a question of the capacity of the power plants at certain places. Possibly Captain Callan would be better able to answer than I, as to whether there are any places that have no power plant at all.

Captain CALLAN. The present estimates are for those plants which are necessary to bring up the total power to that which is required for the fortifications and they do not include any reserve plants whatsoever. For instance, as to this item for central power plants for existing batteries, that amount of power is necessary in addition to what is on hand. It is necessary for the present needs of the defenses.

Mr. SMITH. You did not get that from getting reports from any specific places, but you just tried to fill up what the Taft Board thought would be generally necessary?

Captain CALLAN. At that time we considered the needs of particular places; based of course on the Taft Board estimates for instance, those at Portland, Boston, New York, San Francisco, Puget Sound, and part of Hampton Roads, would take that million dollars.

General MURRAY. That is as estimated by the Taft Board. I have not undertaken to make estimates other than those put in by the Taft Board. In fact it is hardly my province to make estimates anyway. If the estimates are made they should be made by the corresponding supply department. The Engineer Corps would be the one in this case.

Mr. SMITH. It is also true, General, that when a specific thing is needed at a specific fort, your Department furnishes information as to what is needed [to furnish the plant] and they make the estimate of the cost? Is not that the way of it?

General MURRAY. Yes.

Mr. SMITH. You say there are some places where there is no electric light?

Captain CALLAN. Yes. We have places where they have no electric power for lighting fortifications and for the fire-control system, for instance, Fort Casey, at the entrance of Puget Sound, has only sufficient power for two small searchlights.

Mr. SMITH. How much would it take to install all necessary equipment at Fort Casey?

Captain CALLAN. It would cost \$83,730 to install a central power plant for the existing batteries at that place.

Mr. SMITH. Is there any other place now where you have no equipment at all?

Captain CALLAN. Fort Scriven, Georgia, has none with the exception of a small plant which furnishes the power for a 24" searchlight. I can give the details for every fort, exactly what they have. At most of these places, for instance, in the emplacements they have an oil engine or a small steam set. They were put in there from 1898 on, and they supply a very small amount of the power that is now necessary. Since that time the ammunition hoists are motor driven, and they require power; the retraction motors require power, and, furthermore the power that is necessary for lighting has increased a great deal. All the existing plants were taken into consideration when the Taft Board went around to all these places and made these estimates. So, in other words, to give sufficient electric power we must have, for central plants, the amounts that are given there; for instance, for Portland, \$103,239.

Mr. FITZGERALD. At Fort Casey you say there is no plant at all?

Captain CALLAN. None except the two small plants which furnish power for the two 30" searchlights.

Mr. FITZGERALD. Where is that located with reference to some city?

General MURRAY. It is just north of Seattle, on an island at the entrance to Puget Sound. There are three main forts in that vicinity.

Mr. FITZGERALD. How far is that from the city of Seattle?

General MURRAY. About 55 miles, as I recollect it.

Mr. FITZGERALD. Is that the nearest town to it?

General MURRAY. It covers the entrance so Seattle.

Mr. FITZGERALD. Is it sufficiently near to any place that you could get power from?

General MURRAY. No, sir. There is no place in that neighborhood where you could get it.

Mr. FITZGERALD. Some of these places are in the near vicinity of cities?

Captain CALLAN. Yes, some are.

Mr. FITZGERALD. Take, for example, the fortifications around New York. The absence of power plants at these fortifications would not effect their efficiency, because you could easily get all the power you wanted, in case of an emergency, from the cities.

General MURRAY. We would have to bring the power in from the outside, and that has been done in certain cases; during our maneuvers in 1905 we did that down at Fort Monroe. Of course, it is necessary to pay for that power and to install in your own place much of the power plant such as transformers, rotary converters, and motor generators.

Mr. FITZGERALD. I mean the generator.

General MURRAY. We could in some cases get it outside; but then, if you happened to be cut off the power for all of your fortifications would be cut off. That is absolutely necessary for night work, absolutely so, or your fortifications are down and out.

Mr. FITZGERALD. Under existing conditions if we were to have war and it became necessary to obtain power for any of these fortifications, is not that the way you would be compelled to get the power to carry on—to get it from the plants which carry on the commercial establishments in the vicinity of these forts?

General MURRAY. Under existing circumstances, providing you did not appropriate for the power plant, yes.

Mr. FITZGERALD. Even if we do provide them at these places it will take at least five years?

General MURRAY. Yes, if only $\frac{1}{4}$ is appropriated for each year; and in the meantime if anything occurred we would have to do the best we could by obtaining power from outside sources. There would be many cases where this could not be done at all.

Mr. FITZGERALD. That is true and has been true from the beginning up to the present time?

General MURRAY. Yes.

Mr. FITZGERALD. And yet our fortifications in some places have been considered practically in a completed condition?

General MURRAY. Considered so by those who did not know what they are talking about. That is correct.

Mr. FITZGERALD. That is not the information I have gained from sitting in this Committee for two years. My impression has been that at some important places in the country our defenses are practically complete.

General MURRAY. So far as the mounting of guns is concerned. That idea has generally been taken up, that when you have got the guns there, the fortification is completed. The subject of the fire control has not generally been considered when they say the places are completed. I come to tell you that besides putting in the guns there are certain accessories that are necessary.

Mr. FITZGERALD. Is it not somewhat remarkable that not until two years ago, when the Taft Board made report, was there any suggestion that anything like this would be necessary in connection with our fortifications?

General MURRAY. I am not responsible for that. But as Chief of Artillery it is my duty now to tell you what the situation is.

Mr. FITZGERALD. It is either one of two things: Up to 1906 this was not considered to be of any particular importance, or else somebody has been laboring under a very grave error in thinking that we could do without it.

General MURRAY. Up to 1906 certain things had not developed. They were coming in that direction. For instance, take this equipment for ammunition hoists. It has been put in in the last few years, and searchlights have been developing very rapidly in the last few years. It has been known for a number of years that we wanted searchlights, but the subject was never considered definitely, I think, until the Taft Board took it up.

Mr. SHERLEY. General, are these estimates based upon the needs of the various fortified places as now fortified, or do they contemplate

increases in guns and mortars, and so forth, and have you estimated accordingly?

Captain CALLAN. These particular estimates for power plants are for the existing defenses.

Mr. SMITH. That is, the five millions are for the existing defenses?

Captain CALLAN. These particular estimates for power plants are for the existing defenses.

Mr. SMITH. That is, the five million dollars are for the existing defenses?

General MURRAY. The five millions include the additional defenses that were added by the Taft Board. In other words, the Taft Board made an estimate of what is needed for completing the defenses, and included, in their estimate for power plants, the power plants which would be necessary for those additional guns as well as for bringing up the power for the old batteries to that now required.

The \$5,000,000 includes all the power necessary for existing defenses, those proposed by the Taft Board and reserve plants in addition.

This table which I have prepared shows the plants required for existing defenses in addition to those which are now installed. It will be seen that for the existing defenses we now have plants aggregating in capacity 3,660 kilowatts, while there are still required for existing defenses, plants to furnish 3,777 kilowatts. In other words, 49 per cent of the plants for the existing defenses are now installed. The other 51 per cent will cost \$2,501,182.

It must be remembered that the power plants now installed were purchased from appropriations that were formerly made for gun and mortar batteries and it is now desired to separate these accessories, which are absolutely necessary, from the general appropriation under which they were formerly carried, particularly since no appropriations have been made for gun and mortar batteries for a number of years.

Central plants still required for existing batteries in the United States.

Locality.	Total power required for existing batteries in kilowatts.	Total power now installed in existing batteries in kilowatts.	Total power still needed for existing batteries in kilowatts.	Volts, direct current.	Generators.	Boilers.		Power house and cover.	Ma- chinery in- stalled.	Con- duit trench- ing.	Cable.	Tools and labor.	10 per cent super- intend- ence and contin- uen- ces.	Total for post.	Total for har- bor.
					Number.	Kilowatts.	Number.	Horsepower.							
Kennebec River.	15		15		1	15							\$326	\$3,590	\$3,560
Popham.															
Portland, Me.															103,239
Lyon.	5		5		1	5			2,836				284	3,120	
McKinley.	180	150	30		1	30			6,646				665	7,313	
Levett.	190	150	40		1	40			8,182				819	9,001	
Preble.	46	13	35	125	1	35	1	75	17,000	\$4,000	\$1,333	\$750	3,308	36,391	
Williams.	100	100							10,000						
Foster.	50		50	125	1	50	1	100	31,000	300	354	750	4,310	47,414	
Portsmouth, N. H.									10,700						
Stark.	25		25		1	25			4,463				446	4,909	
Constitution.	25		25	125	1	25	1	75	18,000	2,000	1,221	750	3,147	34,618	
Boston, Mass.									9,500						
Heath.									10,800	300	300	750	1,465	16,115	135,733
Banks.	60	10	50	125	1	50	1	100	2,500				326	3,590	
Strong.	85	85							3,264						
Standish.	107	7	100	125	2	50	2	100	18,000	10,000	7,470	750	5,352	58,872	
Warren.	150	150							17,300						
Andrews.	55	20	35	125	1	35	1	75	15,000	2,200	1,510	200	2,891	31,801	
Revere.	65	15	50	125	1	50	1	100	2,500	5,200	4,000	750	2,305	25,355	
New Bedford, Mass.									10,600						
Rodman.	46	11	35	125	1	35	1	75	15,000	6,000	7,458	750	3,921	43,129	43,129
Narragansett Bay.									10,000						
Adams.	120								10,000						219,810
Wetherill.	107	7	100	125	2	50	2	100	45,000	24,004	12,600	750	4,500	49,500	
Getty.	50		50	125	1	50	1	100	40,000	5,600	6,730	750	9,534	104,978	
Greble.	60	60							31,000	5,600	6,730	750	5,478	60,258	
Kearney.	25		25		1	25			150				461	5,074	
Sakonnet River.									4,463						
East Entrance, Long Island.	50		50	250	1	50	1	100	31,000	2,000	1,727	750	4,618	50,705	210,887
Mansfield.	75								10,700						
Wright.	122	52	70	125	2	35	2	75	40,000	1,000	10,705	750	6,806	74,861	
Michle.	98	46	50	250	1	50	1	100	20,000	18,000	23,570	750	7,302	80,322	
Terry.									4,463				446	4,909	
Tyler.									10,000						
Gardiners Island.									15,000						
East New York.			35	250	1	35	1	75	15,000		81	750	2,553	28,414	109,062
Stocum.	40	5							10,000						

Schuyler.....	145	75	70	125	2	35	2	75	8,000	15,850	400	750	2,500	27,500	.....
Totten.....	200	100	100	125	2	50	2	100	22,000	17,300	2,000	750	4,534	53,178	.....
South New York.....															23,100
Wadsworth.....	233	198	35	125	1	35	1	75	4,000	6,500	.....	.....	1,050	11,550	.....
Hamilton.....	247	212	35	125	1	35	1	75	4,000	6,500	.....	.....	1,050	11,550	.....
Hancock.....	197	197									.....	.....	.....	.....	.....
Camp Low.....											.....	.....	.....	.....	.....
Princess Bay.....											.....	.....	.....	.....	.....
Delaware River.....	57	32	25	125	1	25	.....	.....	.....	4,463	.....	.....	446	4,909	.....
Delaware.....	180	60	100	125	2	50	2	100	21,000	17,300	1,000	750	4,086	44,946	.....
DuPont.....	90	40	50	125	1	50	1	100	18,000	10,700	2,250	750	4,124	45,362	.....
Baltimore.....											.....	.....	.....	.....	56,350
Howard.....	157	87	70	125	2	35	2	75	18,000	15,850	1,000	750	3,904	42,942	.....
Smallwood.....	82	47	15	125	1	15	.....	.....	.....	3,264	.....	.....	326	3,590	.....
Carroll.....	47	22	25	125	1	25	.....	.....	.....	4,463	.....	.....	446	4,909	.....
Armistead.....	46	21	25	125	1	25	.....	.....	.....	4,463	.....	.....	446	4,909	.....
Chesapeake Bay.....											.....	.....	.....	.....	.....
Cape Henry.....											.....	.....	.....	.....	.....
Middle Point.....											.....	.....	.....	.....	.....
Cape Charles.....											.....	.....	.....	.....	.....
Hampton Roads.....											.....	.....	.....	.....	.....
Monroe.....	320	120	200	250	2	100	2	200	25,000	27,500	12,000	3,200	10,356	113,919	113,919
Wool.....											.....	.....	.....	.....	.....
Potomac River.....											.....	.....	.....	.....	52,099
Washington.....	153	153									.....	.....	.....	.....	.....
Hunt.....	105	70	35	125	1	35	1	75	31,000	10,000	1,400	750	4,736	52,099	.....
Cape Fear River.....											.....	.....	.....	.....	.....
Caswell.....	127	27	100	125	2	50	2	100	18,000	17,500	2,700	750	4,837	53,206	53,206
Charleston.....											.....	.....	.....	.....	77,621
Sumter.....	25	10	15	125	1	15	.....	.....	.....	3,264	.....	.....	326	3,590	.....
Moultrie (E).....	80	10	70	125	2	35	2	75	40,000	15,850	2,400	750	6,050	7,150	.....
Moultrie (W).....	60	10	70	125	2	35	2	75	40,000	15,850	2,400	750	6,050	66,881	.....
Savannah.....											.....	.....	.....	.....	98,832
Screven.....	107	7	100	250	2	50	2	100	50,000	17,300	8,600	5,550	8,750	96,345	.....
Pulaski.....	5		5	125	1	5	.....	.....	.....	2,261	.....	.....	226	2,487	.....
Key West.....											.....	.....	.....	.....	64,980
Tampa.....	125	25	100	250	2	50	2	100	31,000	17,500	3,750	750	5,908	64,980	.....
Dade.....	120	20	100	250	1	50	1	100	31,000	10,700	1,875	750	5,081	55,673	55,673
De Soto.....	15		15	125	1	15	.....	.....	.....	3,264	.....	.....	326	3,590	.....
Pensacola.....											.....	.....	.....	.....	57,277
Pickens.....	198	98	100	250	2	50	2	100	16,000	17,300	3,800	750	4,761	52,368	.....
McRee.....	55	30	25	125	1	25	.....	.....	.....	4,463	.....	.....	446	4,909	.....
Barranca.....											.....	.....	.....	.....	.....
Santa Rosa.....											.....	.....	.....	.....	.....
Mobile Bay.....											.....	.....	.....	.....	77,521
Morgan.....	170	70	100	125	2	50	2	100	31,000	17,300	5,250	750	6,721	73,931	.....
Gaines.....	35	20	15	125	1	15	.....	.....	.....	3,264	.....	.....	326	3,590	.....
Mississippi River.....											.....	.....	.....	.....	60,341
St. Philip.....	130	60	70	125	2	35	2	75	31,000	15,850	500	750	5,039	55,432	.....
Jackson.....	85	60	25	125	1	25	.....	.....	.....	4,463	.....	.....	446	4,909	.....

Mr. SMITH. What percentage of the Taft Board plan is complete, roughly speaking?

General MURRAY. Of the whole plan?

Mr. SMITH. Yes.

Mr. SHERLEY. And, General, in answering that question if you can, please give the percentage of the various details of that plan. For instance, I presume that certain percentages are greater for certain features of the defenses than they are of other features?

General MURRAY. According to the Taft Board estimates, as I would take the figures, I would say that their plans for the whole are about 75 per cent completed. The figures as given in their reports show that something over \$72,000,000, nearly \$73,000,000, has been already expended on the defenses, and they add as necessary to complete something over twenty-five million dollars. I would say now that in the seventy-two millions are included the great majority of the guns and the mortars. In other words, that has been the most expensive part. That included in the twenty-five millions practically all of the accessories of which I have spoken to you, and those are shown on page 23 of that report, the additional guns being shown in the first part.

Mr. SMITH. I think I understood this statement.

General MURRAY. The estimates of the Board are to put in \$50,000,000 to complete. Take out what is necessary for ammunition and it will make one hundred and twelve million dollars for the completed Taft Board plan.

Mr. SMITH. You are mistaken. Where you are in error, General, is this: This is only additional forts. The forts and fortifications are complete according to the Taft Board at existing ports.

General MURRAY. No. You would probably find that 66 per cent would be more nearly correct where I named 75 per cent, and 33 per cent instead of 25.

Mr. GRAFF. Your estimate of expense of completion is based very largely on the expenditure of money in dollars and cents?

General MURRAY. Yes, assuming that a certain amount was necessary to complete.

Mr. GRAFF. Of course a considerable amount of that money has been spent under the Endicott plan for things which were not altogether of full value when you came to estimate under the Taft Board plan, growing out of improvements and changes of plan and of conceptions of what are proper defenses?

General MURRAY. Yes. In other words, some part of those original appropriations have become obsolete.

Mr. GRAFF. In other words, the dollars and cents computation of the percentage of completion would not be a safe computation of the result?

General MURRAY. Yes. Mr. Sherley called attention to the fact that he wanted the percentage on the different elements, assuming that we should not have the same percentage on all the elements; that at some one place we should have something completed.

Mr. SHERLEY. My idea was this, General, very much as stated by you: What proportion of the plant had been completed, not only in the aggregate, but in detail, so that we could make units serviceable, and also to have your statement based not on a moneyed expendi-

ture, which may vary from time to time, but on the actual concrete things done and contemplated to be done.

General MURRAY. Yes. In regard to that I might say that as soon as I became Chief of Artillery I concluded that it would be better for us to undertake to complete in all their accessories some of these places where they had been putting in guns for a number of years without going ahead and putting in other guns. That is, to drop gun construction and proceed to appropriate for the other necessities. Upon my recommendation, therefore, last year, no estimate was put in for new gun construction in the United States. The estimate was simply for these accessories, which I tell you are necessary in the proper handling of the guns at a given place. Naturally when you find yourself with guns without the accessories—assuming that you are in that position—you would naturally at once say, "It is best to go ahead and get what is necessary to give the proper handling of the guns that we have before going on with the construction of further guns."

Mr. SMITH. These figures would show that 62 or 63 per cent of the Taft Board estimates were already done. Now, \$3,062,000 was for central electric plants, and all the balance was for reserve plants, so that the entire estimate for the Taft Board for anything but reserve plants was about three million dollars; and there being only about 62 per cent of the Taft Board plans installed, the whole amount of the Taft Board's plans, aside from the reserve, was only \$1,800,000; only a half, instead of a fifth, as you might otherwise infer.

Captain HAGOOD. If the members of the Committee desire to know, in answer to Mr. Sherley's question, the total number of guns of each particular calibre as carried by the Taft Board scheme, and the total number of those so far installed of each class, and if they want to know the total amount of money which has been appropriated for the different classes of fortifications and the total amount required to complete under the Taft Board scheme, I have all those figures here, if that is what Mr. Sherley wants to know.

Mr. SHERLEY. I would personally like to know it, but perhaps it would not be advisable to put in all those details.

Captain HAGOOD. It has all been published. It is not confidential. The Taft Board submitted its report to the President on February 27, 1906. Up to that time the defenses of the United States had been installed under the plans prepared by the Endicott Board as modified from time to time by appropriations made by Congress. Under the plans of the Endicott Board, as modified from time to time, fortifications had been established in twenty-seven harbors and altogether some sixty-four different forts had been constructed. Under the plans of the Taft Board the entrance to Chesapeake Bay was added to the list of places to be fortified, and the fortifications of the cities of New London, and New Haven and of Port Royal Sound and Penobscot River were omitted; also a number of lake ports which the Endicott Board proposed to fortify were not included in the Taft Board's plans.

Without going into the details of the changes made by the Taft Board in the plans of the Endicott Board, it may be said that the total armament under the Taft Board's plans was not so great as the total armament proposed by the Endicott Board, and that the amount of work which it is necessary to do to complete the plans of

the Endicott Board, as revised by the Taft Board, is not quite as great as it would have been if the original plans of the Endicott Board had been adhered to. Where new points in the various harbors have been added by the Taft Board, it is really only the redistribution of the armament which it had been proposed to place elsewhere.

In order to indicate the present state of completion of the defenses, I will invite attention to the fact that so far \$29,393,434 has been appropriated or allotted for gun and mortar batteries and \$35,706,608 for guns and carriages, making in all \$65,000,042. The Taft Board estimated that to provide the guns, carriages and emplacements proposed by them to complete the defenses of the United States, \$17,701,900 was necessary. The total number of guns and mortars which have been so far emplaced and the additional numbers necessary to carry out to completion the Taft Board scheme are indicated in the following table:

	Emplaced.	Additional required to complete.
12-inch mortars.....	376	88
16-inch guns.....	0	a 1
14-inch guns.....	0	19
12-inch rifles.....	105	23
10-inch rifles.....	133	6
8-inch guns.....	72	0
6-inch rapid-fire guns.....	171	20
5-inch rapid-fire guns.....	53	0
4.7 and 4 inch rapid-fire guns.....	38	0
3-inch rapid-fire guns.....	254	30

a Gun already manufactured.

The total amount which has been appropriated for submarine mines is \$5,799,202, and the amount estimated to complete the submarine mine defense of the United States, subtracting what has been appropriated since the Taft Board made its report, is \$2,147,932, none of which is for proposed defenses.

For fire control the total amount appropriated has been \$5,790,346, and that which remains to be appropriated is \$7,210,031.

For searchlights the total so far appropriated is \$1,135,000, and that estimated to complete is \$2,710,000, of which \$699,000 is for proposed defenses.

The figures given will indicate, as nearly as practicable in a general way, the state of completion of the various defenses. Under past appropriations for gun and mortar batteries a number of power plants have been installed, as indicated in General Murray's testimony, and the amount which still remains to be appropriated for central plants is \$3,062,664 of which \$561,482 is for proposed defenses. I have not at hand the necessary figures to state what part of the amounts indicated for fire control is necessary for existing defenses and what part is necessary for the additional defenses proposed by the Taft Board, but it may be said in general that a relatively small portion of this money is necessary in connection with proposed additional defenses. Most of it is necessary in connection with defenses already installed.

MR. SMITH. Are you interested, General, in any item in this bill before we reach the item for reserve ammunition?

PURCHASE AND INSTALLATION OF SEARCHLIGHTS.

General MURRAY. I am specially interested in the item for searchlights on page 4. That is one of the accessories of which we have been talking, and which I consider absolutely necessary to handle our forts properly. Without the searchlights the value of the forts at night, if we leave out the mines, is nil.

Mr. SMITH. How much do you estimate would be required to equip, not the Taft Board plan, but the existing fortifications and the existing submarine defense arrangements that have not been provided for with searchlights? Give us what is needed to complete the Taft Board scheme.

General MURRAY. The amount needed to complete the Taft Board scheme is \$2,700,000.

Mr. SMITH. And of that, how much is for fortifications and submarine defense that has not been provided for?

General MURRAY. I think that the percentage of that which has not been provided for would be very small, for this reason: That you need your searchlights to light the waters for each fortification rather than for any particular gun batteries that we put up.

Mr. SMITH. I know that; but as a matter of fact a number of the forts are not fortified at all that are not recommended by the Taft Board, are they?

General MURRAY. In the United States?

Mr. SMITH. Yes.

General MURRAY. There are no new ports added, but there are new points. Deer Island in Boston Harbor is one of those places. The entrance to Chesapeake Bay would be another.

Mr. SMITH. You have no fortifications at all at the entrance of Chesapeake Bay?

General MURRAY. No. That is added by the Taft Board. There is nothing there. Then there are two places in Puget Sound—Foul Weather Bluff and Double Bluff; so that I would say that there are half a dozen new points where there are now no fortifications.

Mr. SMITH. Let us distinguish between new points and new ports. A searchlight at the mouth of Chesapeake Bay is of no account now?

General MURRAY. No.

Mr. SMITH. How many points are there covered by the Taft Board at which, in the absence of new structures, searchlights would be absolutely useless?

General MURRAY. I think I have named all of them; one at Deer Island, and the two at the entrance of Chesapeake Bay; that makes three; then those in Puget Sound. Those are all that I can now recall. The two places in Puget Sound are below the three places already fortified, that is, Worden, Casey, and Flagler.

Mr. SMITH. Can you tell us how much the Taft Board estimates for searchlights at those points where they are not needed at all now?

General MURRAY. Yes, sir. I have the exact number of searchlights that they estimated for at each place.

Mr. SMITH. Can you give the amount in money estimated instead of the number of searchlights?

General MURRAY. Yes. At Deer Island, \$20,000; for the entrance of Chesapeake Bay, \$221,000. There should be added, for Puget Sound \$204,000 and various smaller sums for other places aggregating

in all \$699,000. That is of the total estimate for searchlights, \$699,000 is for lights to be used in connection with new defenses and \$2,011,000, is for lights to be used in connection with defenses already provided. Making a total of \$2,710,000.

MR. SMITH. If there are any additional fortifications which you contemplate at Boston would you need more searchlights for those fortifications?

General MURRAY. There is only one at Boston where an extra light will be put in. The present fortifications, I think, would take in every light that is estimated for by the Taft Board except 39 60-inch lights and 4 30-inch lights.

MR. SMITH. I wish you would insert in the hearings at this point just how many of the lights estimated for by the Taft Board would be needed for the existing authorized fortifications and what would be the gross cost of those lights?

General MURRAY. Yes, sir. There are 83 of the 60-inch lights, and 68 of the 36-inch lights estimated for by the Taft Board needed for the existing authorized fortifications in the United States proper. The estimated cost of these 83 60-inch and 68 36-inch lights is \$2,011,000.

AUTOMOBILE TORPEDOES.

MR. SMITH. On page 9 of the bill there is the item, "For procurement and the test of experimental automobile torpedoes and structures and appliances to operate them at Fort Monroe, Virginia, \$100,000?"

General MURRAY. The automobile torpedo has heretofore been handled exclusively by the Navy. There are certain points in connection with our mine defenses where the automobile torpedo would be a good adjunct to the mines, and others where it is necessary that we should have something of the kind to take the place of mines. The places in question are certain waters of Puget Sound too deep to be mined and the Race at the eastern entrance to Long Island Sound and San Francisco harbor which can be mined, but with difficulty.

The automobile torpedo used by the Navy is fired usually on board battle ships just as you would fire a projectile from a gun, by a small charge, which expels it from the discharge tube. After it has entered the water it is propelled by its own power, and therefore is called automobile. This power is supplied by compressed air, and with the first type made they used 1,500 pounds per square inch to give a range of about 1,200 yards at a given speed. The latest type use about 2,250 pounds of compressed air to the square inch, and it is claimed that these torpedoes have a range, at the same speed as the first type, of approximately 4,000 yards. It is claimed that they will run 3,000 yards at a speed of about 30 knots, and 4,000 yards at a speed of 26 knots. Of course they are set for a uniform speed when they are discharged and the distance run would depend upon the amount of power or the compressed air pressure available. These torpedoes are fitted with a gear which makes them keep the same course on which they are fired in spite of currents that would otherwise deflect them from their course.

MR. SHERLEY. Is that a development of the principle of the English gyroscope?

General MURRAY. Yes, sir. They not only fire them out of the tube directly ahead; but the gear is now so perfected that they can

fire the torpedo and it will run a given distance beyond the vessel and then start off at any desired angle with the direction in which they are fired.

Mr. FITZGERALD. In other words, shoot around the corner?

General MURRAY. Yes, sir; it amounts to the same thing. This estimate was put in to enable the coast artillery to experiment with such torpedoes and I think it is one of the least important items in the appropriation bill.

Mr. FITZGERALD. Can they shoot with great accuracy or is it still in the experimental stage?

General MURRAY. It is claimed that they can be fired with accuracy; and the coast artillery desires to see what it can do with them.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION, SUBCALIBER TUBES, ETC., SEACOAST ARTILLERY PRACTICE.

Mr. SMITH. On page 14 of the bill there is the item, "for the purchase, manufacture, and test of ammunition, subcaliber tubes, and other accessories for seacoast artillery practice, including the machinery necessary for their manufacture at the arsenals," and you ask an increase of \$105,000?

General MURRAY. Yes, sir.

Mr. SMITH. We gave you the full amount of your estimate last year?

General MURRAY. Yes, sir. But Congress authorized last year 44 new coast artillery organizations which have had no target practice heretofore, as we have not had the men. If we had asked for the target practice for those 44 companies in the same proportion that we asked for the 126 companies that we had before, the amount we would then have asked for would have been \$472,222. As a fact, those 44 companies are assigned to smaller caliber guns for which the cost of ammunition is less and the estimate therefore is not proportionately increased to the number of new organizations which we have, but reduced, due to the fact as stated that these new companies are assigned to rapid fire guns for which the cost of ammunition is less than that for larger guns?

Mr. SMITH. Have all the additional companies been organized?

General MURRAY. Yes, sir.

Mr. FITZGERALD. Have they been organized and enlisted?

General MURRAY. No. We have organized them and have enlisted men as fast as we could get good men.

Mr. FITZGERALD. How short are you?

General MURRAY. About fifty per cent.

Mr. FITZGERALD. Does this estimate provide target practice for the one hundred per cent?

General MURRAY. The target practice is for the organizations, and we have to have that regardless of whether they are short or not.

Mr. FITZGERALD. Where your companies are only full 50% would it not be possible to combine two companies for target practice?

General MURRAY. Of course we could do that but we would not get the same practice. We want the practice for the skilled men of the companies operating the fire-control system; not the unskilled men who handle ammunition, and so forth.

MOBILE ARTILLERY.

Mr. SMITH. The next item is on page 15, for the mobile artillery, and there you have added 20 per cent to your last year's estimate rather than 20 per cent to your last year's appropriation?

General MURRAY. We are asking it in the same way as in the case of the coast artillery, to get the increase needed for the increase in field artillery. We had five regiments and there was an increase of one; that is for a 20 per cent increase.

Mr. SMITH. The past two years you asked for \$100,000 and we gave you \$77,000. This year you are making an addition of 20 per cent to your estimate instead of 20 per cent to your appropriation?

General MURRAY. That is because the number of batteries has been increased.

Mr. SMITH. I do not think there is any question of giving you the necessary increase, but why should your appropriation be increased aside from that?

General MURRAY. It is simply a question as to whether you gave us enough last year to carry on the target practice for the field artillery. It is a question whether the \$100,000 asked for last year was a proper amount for the target practice.

Mr. SMITH. You got along fairly well with the \$77,000 until this increase?

General MURRAY. That depends on what you mean by "fairly well?"

Mr. SMITH. Did not your record of target practice show a very good degree of efficiency with the old appropriation and the old force?

General MURRAY. Yes, sir. It showed that we were improving, but we are putting into the field artillery fire-control systems which gives them their indirect fire. It is one thing to shoot at a target that you see, and another thing to shoot by indirect fire where you do not see the target. I think the Navy has very much more than we have per gun.

Mr. SHERLEY. How does your target practice compare with the Navy in efficiency?

General MURRAY. We think it is better.

Mr. FITZGERALD. It is more difficult in the Navy?

General MURRAY. It is under entirely different conditions. They do the best they can and they undoubtedly do good shooting.

Mr. FITZGERALD. They require more practice under the conditions?

General MURRAY. Yes, sir.

AIRSHIPS (AGAIN).

Mr. FITZGERALD. From your standpoint are you interested in the development of air ships or are they more especially for the other branches of the service?

General MURRAY. We are interested but it would be a question as to the use that could be made of them in connection with coast artillery. I have my doubts about anything being dropped from air ships so as to hit the enemy's battle ships or anything of that kind.

Mr. FITZGERALD. But for observation purposes?

General MURRAY. For observation purposes we are very much interested.

Mr. FITZGERALD. Would they be important to your branch of the service?

General MURRAY. Yes, sir; without any question.

SUBMARINE MINES.

As to the item for the construction of mining casemates on page 9 of the bill, the estimate for 1909 as stated is for \$464,964. That amount is what is needed to build all such structures for the United States, except for Cape Henry, Fisherman's Island and San Jacinto in Galveston harbor. The fortifications for Cape Henry and Fisherman's Island not having been built, I have left them out of the consideration; and at San Jacinto the fact that a big sea wall is needed there to protect the fort, I left that for future consideration. As to the mine work I consider that in the same class as the other accessories of which I have spoken. For a comparatively small amount of money expended on completing the accessories for the gun batteries already constructed we would, I believe, get a very large amount of defense.

Mr. SHERLEY. And get it immediately available?

General MURRAY. Yes, sir.

Mr. SMITH. Does the item here balance with the item of \$823,100 on page 21?

General MURRAY. Yes, sir.

Mr. SMITH. If we should conclude that we could not afford to give this \$1,250,000 for the submarine defense this year, the same percentage should be deducted from both of these items?

General MURRAY. Yes, sir; I think that would be best.

Mr. SMITH. That would make them balance?

General MURRAY. Yes, sir; the two items go together; one is for mine buildings, etc., constructed by the Engineer Department, and the other is for the mine material purchased by the Ordnance Department.

Mr. GRAFF. How about the deterioration of submarine mines, is there very much deterioration in the course of time?

General MURRAY. Little or none. If we should lay the cables in navigated waters, so that the anchors from commercial vessels or anything else could strike those cables and cut them, or tangle them, we would lose them; but under ordinary circumstances the cable is stored in the cable tanks, and it is claimed by the manufacturers that a cable thus stored will last fifty years. If we discount that by fifty per cent and say it will last twenty-five years we are in fairly good shape?

Mr. SMITH. Do you keep them in fresh water tanks.

General MURRAY. Yes, sir. We have lately been putting salt water into the tanks, because the people have all complained that they were breeding places for mosquitoes.

Mr. SMITH. Was not the very object of the construction of fresh water tanks to get fresh water because the cables were supposed to last so much longer?

General MURRAY. I do not think that ever entered the consideration. The tanks are necessary for the prompt handling of the cable. The reels of the cable weigh approximately five and a half tons, and to handle them as should be done in the event of war you must have apparatus to get up the reels quickly and get them out and on the mine planters ready for laying the cables from the mining casemate to the mines promptly. If we had unlimited time it would be a different thing; but to go out on a wharf and drop the reels in water

surrounding the wharf and trust to luck to finding the reels when wanted would be very unsatisfactory. The tanks are provided with overhead apparatus for hoisting these reels and handling them promptly. If the mines are to prove of value in the event of sudden war, we must be provided with means for planting them promptly.

Mr. SMITH. When these tanks were being built in larger quantities than now were we not told that to keep the cables in fresh water would preserve their life?

General MURRAY. That is possible; I never heard of it.

Mr. SMITH. Do you not think that was the theory of your department, that they would last longer?

General MURRAY. The whole submarine work was under the Engineers until it was turned over to the Artillery by the act of February 2, 1901. What the officers of the Engineers had done prior to that time in regard to the cables, I do not know. I think we know more about cable now than they did in those days.

SEA WALL AT SAN JACINTO, GALVESTON HARBOR.

There is one item on page 8 of the bill which I think I ought to call to the attention of the Committee, and that is the sea wall at Galveston. As you know by reason of the Galveston flood we lost everything we had at San Jacinto and at Travis, except the fortifications proper and there is no prospect of anything being done in the way of handling the guns at either one of those places until a sea wall is built around one or the other. The most important of the two is San Jacinto and until a sea wall is put around the fortifications I do not believe it would be safe to put the men required to man the guns of the fort even in tents in time of war. That is, assuming that there is any danger of a flood as in the past. At the time of the Galveston flood 38 men of one of the companies stationed at Fort San Jacinto were drowned.

Mr. SMITH. But everybody else on the whole island is in the same situation?

General MURRAY. Yes, sir; but the whole island now has a sea wall around it, and our fort is still left out. There is a sea wall around the whole water front of Galveston proper.

Mr. SMITH. Is it not a fact that no definite plan has as yet been made as to where the troops are to be quartered, whether at Fort Crockett or at Fort San Jacinto?

General MURRAY. That is not exactly correct, because the Secretary of War has approved a recommendation made by me that the troops shall be quartered at Fort Crockett, and be sent down to San Jacinto for such work as can not be done at Fort Crockett. The troops can be trained in all that pertains to the handling of guns at Fort Crockett. But the only place that instruction in mine work can be given in Galveston is at San Jacinto; and it will be necessary in training the troops in mine work, if they are quartered at Fort Crockett, to send them daily, either on foot or by the best means of transportation we can give them, to San Jacinto for such instruction. It may be found that it is not practicable to send them daily that distance.

Mr. FITZGERALD. How far is it?

General MURRAY. About four miles, I think. If it is not practicable then we will have to build at least a barrack enough there to take care of the mine company, and administer that company from Fort Crockett; that is it is not contemplated to build an administration post at San Jacinto.

Mr. SMITH. As a matter of fact, the guns at San Jacinto are thoroughly protected now, are they not?

General MURRAY. I think they are. I do not think there is any danger for the guns proper.

Mr. SMITH. You have not any plan for the erection of barracks or quarters there?

General MURRAY. None whatever at Fort San Jacinto.

TORPEDO PLANTERS (AGAIN).

Mr. SMITH. You only have four torpedo planters for the whole Atlantic coast?

General MURRAY. Yes, sir.

Mr. SMITH. Now you propose two for Manila and Subig Bay?

General MURRAY. Yes, sir. The four torpedo planters on the Atlantic coast are for instruction purposes. They go from harbor to harbor for that purpose, spending a given time in each to instruct the men in mine planting. One of the four is kept at all times at the School of Submarine Defense, heretofore at Fort Totten.

Mr. GILLET. Where is Fort Totten?

General MURRAY. Near New York, at Willetts Point. The two schools, one heretofore at Fort Totten and the Coast Artillery School at Fort Monroe, will be combined at Fort Monroe, and there will be one of the four torpedo planters kept at the combined school for instruction purposes at all times. The other three torpedo planters which we have on the Atlantic coast will go from post to post and give instruction in mine planting. There are on the Atlantic and Gulf coasts 26 posts in which instruction in mine work should be given. The three boats will then go from harbor to harbor, giving as nearly as practicable a month's instruction in mine work at each fort in a harbor provided with a mine equipment, and then pass on to the next harbor.

When these four torpedo planters were obtained I recognized that some means of instruction at the different posts must be taken up.

I knew that I could not well come here and ask for a boat for instruction in mine work at each of the 26 forts now provided, or partially provided with a mine equipment. I might say that until this matter was taken up by the Artillery all instruction in mine work had been given at the school then called the Torpedo School at Willetts Point or Fort Totten by the Engineers, and they had trusted to dividing up their men skilled in mine work on the outbreak of war, and then to laying the mines as they did in 1898. As soon as I took charge I concluded at once to try and get not only all the material that would be wanted at each place, but also to train men at each particular place to plant mines, and handle them in the way they should be handled in war, recognizing that if mines are to be serviceable they must be promptly planted on the outbreak of war. This scheme of having boats go from harbor to harbor, without undertaking to get all that would be needed in war time for planting then occurred to me.

Mr. FITZGERALD. You got them from the department, not from Congress?

General MURRAY. Yes, sir. At a time when there was some extra transportation money available for building boats. The boats are now used on the Atlantic coast, and I think they have paid for themselves a number of times over in the instruction they have given. That is my individual opinion. You might ask me what I intended to do in war time at the different posts if I had only this small number of boats for such work. In addition to these boats there is at each artillery district a smaller boat, not intended for torpedo planting; but I had considerable to do with the designing and they were designed with a view to helping out in this work. It is intended to have one such boat at each place where mine work is to be done; and to have the necessary apparatus for handling mines fitted to these boats, so that it could be installed on them quickly in case of need and they could be used to help out in the mine planting. Recognizing that even these boats in addition to the torpedo planters, will not be sufficient, and that there is a type of lighthouse boat in each Light House district that can readily be adapted for mine work, as they are almost identical in type with our torpedo planters which were modeled after them.

I went so far as to ask that the Joint Army and Navy Board pass a resolution, which was done, that on the outbreak of war all of these lighthouse boats should be turned over to the Artillery temporarily for the use of mine planting. That resolution has been approved and the boats will be turned over and no charge will be made against the Army appropriation, as they will be turned over to us for temporary use, and be carried on their regular appropriation. In order to enable us to use them as mine planters it will be necessary that they be equipped with mine planting apparatus, and I have decided to undertake to have built for each one of those boats a mine planting apparatus which will be fitted to the particular boats in the districts, and will be stored at the forts where we have a mine equipment. Thus in case of war we would have for planting mines on the Atlantic coast the four torpedo planters to start with; then the smaller boats in the districts, which are fitted with apparatus; and then these Light House boats fitted with planting apparatus, which would be loaned us for mine planting. By means of those boats we could probably plant the mines in the way I have stated and it would not be necessary to go into the cities and try to hire tugs and other boats of that type which are not suitable for mine work, and which can not be well fitted up for it.

Mr. FITZGERALD. Could you not procure certain vessels from the Navy that are now used for setting out mines, some of the vessels in the Navy which it is intended to equip for that purpose?

General MURRAY. No, sir. Their mines and ours are entirely different, and what they have in this line would not be suitable. So far as I know they have no other boats that would be suitable.

Mr. FITZGERALD. There has been an estimate submitted?

General MURRAY. Yes, sir; that is by the Navy Department for two boats for planting mines.

Mr. FITZGERALD. That is to convert two of the earlier cruisers into mine planters. In making these changes why could not the

apparatus be installed to enable your branch of the service to utilize them at the point they happened to be in putting out your mines?

General MURRAY. Because it takes an entirely different type of boat. To understand that you would have to know the difference between the naval defense mine and our mine. Their mine is comparatively light and it has what is known as an automatic anchor. The anchor only weighs about 500 pounds and the mine about the same. Their mine as ordinarily planted has no connection with the shore; so that all they have to do to plant them is to get under way and by means of davits that will carry a mine of that type to drop their mines where they want to plant them. With ours we have to plant them by starting from a mining casemate with a planter and laying cable from a reel, which, as I have told you, weighs about five and a half tons, and for handling which we have to have special apparatus on the deck on the planter. The planters lay the cable from the casemates and at the end of the cable we start in with the mine planting proper, by connecting the mines with the cable leading from the casemate, which is a nineteen cored cable, each core corresponding to a given mine. We get as big or as many cored cable as we can in order to reduce the cost of cable as much as possible. When the mine work was turned over to the artillery engineers their largest cable was seven cored. By using the nineteen cored cable you see that reduces the expense of cable running out to the mines. We still use the seven cored cable as far as it is possible, though there is less of it on a reel than in case of the nineteen cored cable.

Mr. GILLETT. That gives you nineteen mines?

General MURRAY. Yes, sir. The nineteen cored cable is run out to what we call a distribution box. From that distribution box we run out a single cable to each mine, and each mine is then directly in control from the mining casemate. Under the system as we took it from the Engineers they had a seven cored cable running to a distribution box, they then called it a grand junction box, and they ran from the grand junction box to what they called a triple junction box, from which three cables led to three different mines. You will see that under their system they had twenty-one mines corresponding to their seven cored cable, in other words, three mines on each cable. With the new system we have a nineteen cored cable with only nineteen mines. Under this new system if you fire by judgment, which we undertake to do as a vessel goes over the mine field and, provided the vessel does not hit a mine and actually make a contact, we fire the nearest mine to it as it passes. Under the Engineers' system, if we undertook to fire a mine we would have to fire three. It was very soon found by us that we would be wasting ammunition and that it would be sufficient to shoot one mine at a time. We then concluded to use a nineteen cored cable and connect the casemates with each mine. We will use all the old material as far as possible, and then put in the new material. To handle that class of material the Navy has no boats. The only boats are the light-house boats.

Mr. FITZGERALD. The *Baltimore* is one of the boats to be converted. There would be no difficulty in putting aboard the *Baltimore* a five-and-a-half ton reel, and if they simply put on the apparatus could not you use that boat in setting your mines in case of emergency?

General MURRAY. It would be possible to fit up a boat like the *Baltimore* so that we might use her, but the Navy will fit that boat

with their mine planting apparatus and with their mines. As I understand it, they expect to take those boats along with them and to use those boats for any harbor they may wish to close behind them or anything else. In other words, their object, as I understand it, is to get these boats to go with the fleets. They would take the mines off from their battle ships, each one of which has heretofore been equipped with a certain number of mines, and to put them on a separate ship. They are not boats to be left at home for any work.

Mr. FITZGERALD. How many of those boats are there?

General MURRAY. There are always two lighthouse tenders in every lighthouse district, and sometimes in a big district like New York you will find that the lighthouse engineer has two or possibly more. I think that he has only two of this class and the lighthouse inspector has two. The first is an Engineer officer's, and the last is a Naval officer's. They have the same number. In a small district there is one for each man.

Mr. FITZGERALD. At New York you would have four boats available?

General MURRAY. Yes, sir; and it is possible that there might be some others.

Mr. GILLET. How much will it cost to fit up each one of the lighthouse vessels?

General MURRAY. Four or five hundred dollars apiece, which is quite different from the expense of building or buying a boat and keeping the people and all the other things connected with it.

Mr. FITZGERALD. Could the revenue cutters be used for that purpose?

General MURRAY. I would have to look at the boats.

Mr. SMITH. How much does it cost the Government to keep one of these torpedo planters in commission—every expense, the men, coal, and everything?

General MURRAY. I think about \$30,000 a year for each. That is the reason I recognized that I could not come here and ask you for one for each place, and I did not think it would be best to do so. I am trying to devise a system whereby I could instruct the artillery with a limited number of boats and then get those we would need in war time in some other way.

Mr. SMITH. What do you say as to whether the Government has in any of the other branches of the service any boats at Honolulu or Manila that could be utilized in the way you have spoken of for this purpose?

General MURRAY. They have no boats out there that we know of.

Mr. SMITH. Have you not smaller transports out there which could be utilized?

General MURRAY. No, sir.

Mr. SHERLEY. What is the size of these torpedo planters?

General MURRAY. The four we have are one hundred and fifty feet long and about thirty feet beam. They are almost identical with the lighthouse tenders, a boat with a good big forward deck, room where we can handle our mines and put our mine handling apparatus on.

Mr. SMITH. On what theory do you claim that you need two of these expensive boats for Manila and Subig Bay?

General MURRAY. Because we have not the other type of boat that I have called your attention to. In war time we would have two big places there to mine and it is a question of how long it would take

to mine those places. To plant mines in Subig Bay equipped with the best type of planter we have, it would take me about twenty-four working hours. I have two hundred and nine mines there and planting them at the rate of ten an hour would make twenty-two working hours, and assuming that there would be some little mishap, because you can not say that you can plant ten an hour working steadily for a long time, because something will turn up. Assuming, however, that everything went smoothly with a good torpedo planter, I ought to be able to plant the mines in twenty-four hours. At Manila there are four hundred and ninety-four mines and if I had a single planter the best I could do would be to plant those mines in fifty working hours.

Mr. FITZGERALD. Did we mine any places during the Spanish War?

General MURRAY. We undertook to mine all the harbors that were fortified, and we put down in all fortified harbors a certain number of mines, but I think, as a rule, the Engineers were from one to three months mining.

You allowed one torpedo planter last year for the Pacific Coast. If we get another, that one can work at San Francisco and San Diego and the other at Columbia river and Puget Sound for instruction purposes, then in time of war of course we would put the planters at the places of most importance, one at San Francisco and the other at Puget Sound. Then we would get light-house tenders for the work at San Diego and at the Columbia River. As to how long it would take to mine those places, if I could get the requisite number of boats I think I could mine them in forty-eight hours, but it would take hard work to do that.

Mr. SMITH. There would not be much of a hurry at Subig Bay after the Dewey dock was taken out of there.

General MURRAY. I think the place should be closed up at once so that an enemy could not go in and use it as his rear base.

Mr. SMITH. It is a pretty dangerous thing to take a ship inside a harbor when you have not the fortifications inside?

General MURRAY. Yes, sir; the mine work would assist the guns in keeping an enemy out.

Mr. SMITH. Why would an enemy go in if they had to pass the fortifications again in coming out?

General MURRAY. I think they could readily knock the fortifications out of existence in a very short space of time, if they could ever get inside the harbor, and fire at the batteries from the rear.

Mr. FITZGERALD. What would be most valuable, a mine planter or a submarine boat?

General MURRAY. I believe in the mine planter, in the mines. If the submarine boat does not succeed in doing something more in war time than it has yet succeeded in doing, I would rather trust to the mines.

Mr. SMITH. Has either one ever done anything in war time? Is there any case in history of the destruction of vessels by a mine system?

General MURRAY. A number were destroyed at port Arthur during the last war.

Mr. SMITH. They were not of this type of mine?

General MURRAY. No, because they were not run over.

Mr. SMITH. But this system of mines you are speaking of, has it ever proven actually effective in war?

General MURRAY. No, sir; never in war. The present system has been recently developed.

Mr. SMITH. Both the submarine boat and the submarine mine is now laid in a theoretical defense rather than one demonstrated in actual warfare?

General MURRAY. It has been proven over and over again that a submarine mine where struck will destroy a battle ship. The submarine boat, so far as I know, has never done anything at all. In other words, a mine system has two effects, one, moral and the other, actual. I believe the same as you do, that from all history we know the greatest effect of the mine is the moral effect. I know from experimenting with our own system in our maneuvers which we have had lately that our mine system will work and work effectually, and that an enemy undertaking to run over our mine fields would undoubtedly be stopped. I do not know what would happen with submarines. So, with regard to our mine system in the Philippine Islands or at any other place, I believe that it is the moral effect, the deterrent effect, that would prevent in the present day any commander of an enemy's fleet, no matter how enterprising he might be, from undertaking to run over those mines until he was absolutely certain in his own mind that their destructive power had been taken away.

Mr. SMITH. Did not Dewey suppose at the time he entered Manila Bay that the harbor entrance was mined?

General MURRAY. He probably thought that the mines were not worth anything; I do not know.

Mr. SMITH. It was understood that the entrance to the harbor was mined at that time?

General MURRAY. I do not think so. It is simply a question of what they think of the class of mines. I do not think that anyone who knows as much about our mine system to-day as I know would for a second think of running over the mines until he cut the cables and absolutely destroyed the mines.

Mr. SMITH. I have no doubt about that; but suppose he did not know about our mines. A foreign naval commander would not know about our mines?

General MURRAY. I think they know enough about our mines to stop before them. That is one thing I have undertaken to let them know that we had a good mine system. I have not hesitated for a second to say that we had a good mine system. I believe it is a good thing to tell anybody if you have anything that you are absolutely satisfied in your own mind will work and work successfully. I do not believe in undertaking to keep that to yourself. If you have some doubt in your own mind as to the value of your invention, whatever it may be, why, I think the more secret you can make that and scare the enemy by the secret, the better it is.

Mr. SMITH. Every one of these planters is equipped with one or more small launches?

General MURRAY. There is one launch on each boat. In this item they ask for a number of other launches.

Mr. SMITH. Yes; nine.

General MURRAY. That is a different type of launch from the one that the planter is equipped with. The launch that the planter is equipped with is intended to carry simply the officer who has charge of the work from place to place. He has to go around and attend to the work and see that everything goes properly at the different places.

These launches asked for here are what are known as distribution box boats. You remember, I spoke of the junction boxes. The distribution box with its cables when attached will weigh in round numbers a thousand pounds. Heretofore we have undertaken to handle those from our small type of yawl boats. When you get a thousand-pound box with its nineteen cables running out from the stern of the boat and the men that are in that boat undertake to lift it up and drop it overboard even in the best of weather it is a difficult proposition, and in rough weather we have had the boats turn over a number of times. We lost one man down at Fort Caswell. The boats of this type are for handling the distribution boxes. We are using some money under another appropriation for making these small boats in the United States. I am undertaking to design an apparatus that will handle the distribution box, recognizing that we could not properly handle a weight of that kind from a yawl boat or anything else that we could get.

Mr. SMITH. What was the appropriation you found this money in?

General MURRAY. Last year I got an appropriation of \$725,000 in the regular Military Appropriation bill for boats for the seacoast Artillery service. You will find that it is intended to build a type of boat that we use in each district for all of our target work and for smaller boats. As you know, we fire now entirely at moving targets.

Mr. SMITH. That is exclusively used in connection with the seacoast submarine artillery defense?

General MURRAY. Hardly exclusively, but largely so.

Mr. SMITH. That was the ostensible purpose for which the appropriation was given?

General MURRAY. Yes, sir; it was for the seacoast Artillery service, and that includes the service of both guns and mines.

Mr. SMITH. How many of the nineteen cord cables, as you call them, can you unreel from one of these planters?

General MURRAY. One.

Mr. SMITH. Then what use have you for four of these launches for each torpedo planter?

General MURRAY. You will find that is not what is included in the estimates. One at Hawaii for the one planter there. That was under the assumption that we could possibly get another boat to help out in the work at Hawaii and assuming that I had one planter there. We need one launch for that one boat. If I had to mine the harbor of Honolulu and Pearl Harbor at the same time I would try to get some other boat.

Mr. FITZGERALD. When do you think you will be called on to mine Pearl Harbor, for which you want this launch?

General MURRAY. I think I will be called on the very moment that this Committee decides to fortify or undertakes to defend Honolulu.

Mr. FITZGERALD. Do you not know that you would have trouble in getting a launch in there and certainly you could not get the planter in. How many tons burden is the planter?

General MURRAY. I do not know. As I said, it is about one hundred and fifty feet long and has a thirty-foot beam.

Mr. FITZGERALD. How much draft?

General MURRAY. About thirteen feet. You gentlemen have been out there and know that Pearl Harbor is about seven miles from Honolulu. Let us assume that we have fortified Honolulu and not undertaken to close Pearl Harbor. It is my opinion that any enemy

undertaking to attack Honolulu would proceed to Pearl Harbor with such vessels as could enter there, send in their launches to carry their people and land them, which they could safely do on the shores of Pearl Harbor, and they would then come down on the rear of Honolulu and attack it accordingly. It is simply a question as to whether the launches of a battle ship or other boat could enter Pearl Harbor and land the people in your rear. Now what I would undertake to do would be to go over there and mine the harbor, which would take comparatively few mines, and then with the small guns undertake to keep the enemy from getting into the harbor. My idea is that at the same time you should fortify Honolulu you should close the entrance to Pearl Harbor.

Mr. SMITH. Why do you want four of these launches at Manila?

General MURRAY. I want one planter out there for instruction purposes, one planter and do the instruction both at Subig Bay and at Manila, as is done in the east here.

Mr. SMITH. You want two more launches?

General MURRAY. I will tell you why I want them. In war time I would then have two boats and I would hope to get at least one more boat at Subig Bay just like the boat which is now there. I would hope to get in Manila some other type that could be used for planting and if necessary a planter run out one cable at a time to a distribution box boat and then go back and get another one and let the work go right along.

Mr. SHERLEY. Would you not have less difficulty in getting launches in an emergency than you would have to get boats sufficiently large to plant your torpedoes?

General MURRAY. A launch of the type I want is not in existence to-day and it is simply a question of building those launches. The amount of money that is wanted for the launches is comparatively small.

Mr. GRAFF. How much do they cost?

General MURRAY. About \$3,000 each.

Mr. SHERLEY. There seemed to be a world of launches of one kind and another out in the Philippines when I was there?

General MURRAY. There is no question about that. It is simply a question of the type of boat with which you can handle this apparatus, the distribution box with its corresponding cables.

Mr. SMITH. Is it not a fact that training men with the highest grade of apparatus is bad for them if you have to make them work with crude apparatus?

General MURRAY. If they learn the apparatus which they carry on the big planter they can handle it on the cruder boats.

Mr. SMITH. If a man is going to work on a crude boat would it not be better to train him on a crude boat than on one of these large torpedo planters?

General MURRAY. No, sir.

Mr. SMITH. Do you not think the tools he has to use in practice are of any value?

General MURRAY. Yes, sir; he would use the same tools, but on the cruder boats it takes more time and it does not handle the apparatus so well. So I would say train him with the better boat and put him on the cruder type if necessary.

I want to call the attention of the Committee to the fact that I have tried to keep the number of planters down to what would be needed

for instruction purposes on the Pacific coast and that I have gone as far as I could in trying to get boats in every way possible to help out in case of war from the Navy or elsewhere. I am not trying to get a large number of planters for the United States. For instance, there are only two asked for instruction duty on the Pacific coast as against the four on the Atlantic coast, but in my judgment, I think we should certainly have one at Honolulu, and I think we should have one at least at Manila, and I think it would be better if we had two.

Mr. FITZGERALD. If you get these four planters will that be all that you will need?

General MURRAY. For instruction purposes, yes, sir.

Mr. FITZGERALD. If you get those four will that be all that will be required?

General MURRAY. Two will be wanted for the Pacific coast as far as my judgment goes, and for the Atlantic and Gulf coasts I have four.

Mr. FITZGERALD. For the Atlantic Coast and the Gulf?

General MURRAY. For the Atlantic Coast and the Gulf, I think the four we have are adequate for all construction purposes.

Mr. FITZGERALD. After you have got all you need for instruction purposes you then come and say, "We should have these others to use in case of necessity." How many ought we to have?

General MURRAY. I do not believe we need, and I would not ask you to-day to give me, one more. I believe we have got enough. I think we have enough boats, with the method I have told you, for war time. That is as far as I can speak from my own personal belief. Let me put in a proviso, a providing clause, not for the Atlantic Coast, but for the future that may come in there. It is a question if you ever fortify Guantanamo and some of those places down there, and if so, then I may come to you. But for the Atlantic Coast I believe that the four planters are enough for instruction purposes. I believe that we should have two on the Pacific Coast, and I believe that we ought to have at least one planter at Honolulu and one in the Philippines. I believe the money would be well expended to put in two at the Philippines, as asked for. Of course, that is a question where you may differ with me. As I said, I have not undertaken to get a large number of torpedo planters here in the United States; only those that were wanted to fit the work to be done, and recognizing that there was a difference out in the Philippines, where trouble might arise, and where we are a long ways from home.

FOR CONSTRUCTION OF MINING CASEMATES, ETC.

Mr. SMITH. Now, General, unless I am mistaken, the next item you are interested in is on page 24, near the bottom, "For the construction of mining casemates, cable galleries, torpedo storehouses, cable tanks, and other structures necessary for the operation, preservation, and care of submarine mines and their accessories at the defenses of Honolulu and Pearl Harbor, Hawaii." Now, I notice that you have no needs in here for mining casemates and the like for any Insular positions except Honolulu and Pearl Harbor.

Gen. MURRAY. For the simple reason that the mining casemates and the like have been built or allotted from appropriations that you provided last year at Subig Bay and Manila. That is completed. From an appropriation that you made for Guantanamo several years ago the torpedo structures have been erected there, so that

of the four places, Subig Bay, Manila, the Hawaiian Islands, and Guantanamo, three have been completed. The structures that are wanted there, though we say they are for Honolulu and Pearl Harbor, would be only put in one place. That is, all the mine equipment would be in the structures built at one place, and both harbors would be mined from material stored in that place. Unquestionably the place where the mining material would be stored would be, I think, at Honolulu.

FOR PURCHASE OF SUBMARINE MINES, ETC., INSULAR POSSESSIONS.

Mr. SMITH. Now turning to page 27, we find the item, "For the purchase of submarine mines and necessary appliances to operate them for closing the channels leading to the principal seaports of the insular possessions, \$472,000." This item covers what places?

General MURRAY. Manila.

Mr. SMITH. How much is for Manila?

General MURRAY. Three hundred and twenty-eight thousand six hundred and twenty dollars.

Mr. SMITH. How much is for Subig Bay?

General MURRAY. Nothing. Subig Bay is completed.

Mr. SMITH. How much for Honolulu?

General MURRAY. Twenty-two thousand nine hundred and sixty-three dollars.

Mr. SMITH. How much for Pearl Harbor?

General MURRAY. Thirty-eight thousand and thirty-one dollars.

Mr. SMITH. How much for Guantanamo?

General MURRAY. Eighty two thousand four hundred and thirteen dollars.

Mr. SMITH. These estimates involve the entire completion, then, of the submarine defenses at all the insular possessions?

General MURRAY. At all those four places.

Mr. SMITH. It does not include Guam, of course?

General MURRAY. No; neither Guam nor Kiska nor San Juan.

Mr. SMITH. Now, there is no estimate, I believe, for practice ammunition in the insular possessions, is there?

General MURRAY. No, sir. There is no estimate for any.

Mr. SMITH. Is there any other item in the bill that you are interested in, General.

General MURRAY. I wanted to make one general remark that would close all that I would have to say to the Committee, and that is that I believe that it would be better in all instances where we have guns mounted at a given place to complete the accessories that are needed for those guns before adding additional guns. In other words, that would be the way to get the full value of these guns, which are the costliest and most expensive part of defenses, before we go to work putting in more guns. When the question of putting in more guns comes up it will be a question of the relative importance of each particular place and the necessity of adding guns there. I would recommend that you appropriate for accessories to the guns rather than to add more guns in order that we may get the full value of those we have first, before getting something else.

I would like also to call the attention of the Committee to these sheets, covering four places on the Pacific coast (see table p. —); and also these other sheets for the four places, Manila, Subig Bay, Honolulu and Pearl Harbor, and Guantanamo [submitting same].

Fortifications for Insular Possessions.

Locality.	Guns, carriages, and emplacements.							Cost.	Total.	Reserve ammunition.
	Caliber.									
	14-inch.	12-inch.	10-inch.	8-inch.	6-inch.	3-inch.	12-inch M.				Sites and emplacements.
MANILA BAY.										
Projected, National Coast Defense Board.....	8	6	2		9	12	20			\$1,393,200
Constructed or allotted for.....	2	6	1		5	4	12			88,562
Remaining.....	6		1		4	8	8	\$6,488,000	\$1,200,800	\$7,688,800
Estimated for 1909.....	6		1		4	8	8	6,488,000	1,200,800	7,688,800
Not asked for.....										77,500
										1,232,108
SUBIG BAY.										
Projected, National Coast Defense Board.....			2		4	8				190,400
Constructed or allotted for.....			2		4	8				11,424
Remaining.....										178,976
Estimated for 1909.....										26,000
Not asked for.....										153,976
PEARL HARBOR AND HONOLULU.										
Projected, National Coast Defense Board.....	2	2				4	16			1,280,000
Constructed or allotted for.....		2								76,800
Remaining.....	2					4	16	1,110,000	693,400	1,803,400
Estimated for 1909.....	2					4	16	1,110,000	693,400	1,803,400
Not asked for.....										1,165,700
GUANTANAMO.										
Projected, National Coast Defense Board.....		6			4	8	8			557,400
Constructed or allotted for.....					4	4				38,444
Remaining.....		6					8	1,020,000	619,400	623,956
Estimated for 1909.....		6				4	8	1,020,000	619,400	42,500
Not asked for.....										481,456
Total required to complete Manila and Subig bays, Pearl Harbor and Honolulu, and Guantanamo.....								8,618,000	^a 76,400	76,400
								2,560,000	11,208,000	3,215,740
Total estimate (1909) for above-named places.....								8,618,000	11,626,000	182,500
Total remaining, not asked for.....								3,006,000		3,033,240

^a Tools, inspection, etc.

Locality.	Submarine mines.		Searchlights.		Power plants.	Fire control.	Other items.	Total.	
	Engineer structures.	Ordnance material.	Number.						Cost.
			36-inch.	60-inch.					
MANILA BAY.									
	Projected, National Coast Defense Board		1	8	\$159,000	\$561,086			
	Constructed or allotted for		1	8	159,000				
	Remaining	\$328,620			159,000	561,086	a \$175,000 b 12,000	\$9,261,086	
	Estimated for 1909	328,620				c 89,617		1,321,725	
Not asked for									
SUBIG BAY.									
	Projected, National Coast Defense Board		1	6		243,381			
	Constructed or allotted for		1	1		100,000			
	Remaining			5	95,000	143,381			
	Estimated for 1909			5	95,000	105,716	a 175,000 d 6,000	550,107	
Not asked for					c 54,917		208,983		
PEARL HARBOR AND HONOLULU									
	Projected, National Coast Defense Board		4	5		68,938			
	Constructed or allotted for		4	5		320,656			
	Remaining	129,000	60,994		131,000				
	Estimated for 1909	129,000	60,994		131,000	34,469	a 175,000 d 6,000	2,698,019	
Not asked for					c 34,469		1,200,169		
GUANTANAMO.									
	Projected, National Coast Defense Board		2	6		146,803			
	Constructed or allotted for		2	6		280,606			
	Remaining		82,413	2	132,000				
	Estimated for 1909		82,413	2	117,000	103,727	280,606	c 3,000 e 175,000	
Not asked for					43,076		714,532		
Total required to complete Manila and Subig bays, Pearl Harbor and Honolulu, and Guantanamo									
		129,000	472,027		517,000	725,071	1,305,739	76,400	
								18,299,577	
		129,000	472,027		502,000	502,992	1,305,739	15,272,258	
						c 222,079		3,446,319	
Total remaining, not asked for									

a Torpedo planter.	b Four launches.	c Reserve plants.	d Two launches.	e One launch.
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One launch.

Two launches.

Reserve plants.

Four launches.

Torpedo planter.

These give you every item that is necessary to complete the Pacific coast; that is, the first ones, and the second ones give you every item that is necessary for these insular possessions, so that you will have those four before you in the discussion of those places. I have had these made up for your information.

In concluding my hearing, Mr. Chairman, I would like, with your permission, to attach a few pages from my annual report, showing the condition of the personnel with regard to fortifications, and what I think may be done in that direction.

Mr. SMITH. We will be glad to have it, General.

(The following are the quotations referred to:)

**EXTRACT FROM REPORT OF CHIEF OF ARTILLERY, U. S. ARMY,
1907.**

PERSONNEL.

The act of January 25, 1907, provided an increase of 5,043 enlisted men in the Coast Artillery. Of this increase 4,970 men were for the purpose of providing one complete manning detail for all mines, searchlights, and power plants to be operated in connection with the defense of all fortified harbors of the United States now completed or under construction. Deducting this 4,970 from the authorized maximum enlisted strength, 19,321, there remains 14,351 authorized by law for manning all guns now mounted in the fortifications of the entire country. These guns, however, actually require 36,863 men for one complete detail, so that the maximum number of men now authorized for gun defense is 4,080 short of one-half of one complete manning detail for the guns already mounted in the United States.

In addition, 330 men will be required for the operation of the mines, searchlights, and power plants and 5,546 men for the gun defenses of the United States projected by the National Coast Defense Board, making a total of 47,709 enlisted men required for the defenses of the United States alone as now completed and projected. For the defenses of the insular possessions and of the Panama Canal, as projected by the National Coast Defense Board, there will be required 1,270 men for the operation of mines, searchlights, and power plants and 6,131 men for the gun defenses, a total of 7,401 men. It is thus seen that 55,110 men are required for one complete manning detail for all our defenses as completed and projected.

When Congress began the present method of yearly appropriations for coast defenses, under which about \$84,000,000 have already been appropriated for the United States and insular possessions, no doubt some thought was given to the question of the number of men that would be necessary to care for the costly fortifications, to enable proper training in the duties of coast artillerymen to be given in time of peace, and also to insure the efficient handling of all elements of the defenses in time of war.

It has heretofore been held that at least one complete manning detail for all guns mounted and mines to be planted should be provided in time of peace, and it has been thought by some authorities that in time of war two and possibly three reliefs would be found necessary for certain positions. Furthermore, it has been recommended by former chiefs of artillery that the coast artillerymen authorized by law should be distributed among all coast artillery forts as proportionally as practicable, according to their armament.

This policy was followed by the War Department until last year, when, on my recommendation, the Secretary of War approved a scheme of concentrating the men in each artillery district in one or more main posts, giving as nearly as practicable one complete manning detail at these main posts, but leaving at all other posts in the district only small care-taker detachments of just sufficient size to properly care for their armament and equipment; the smaller posts, according to the scheme, are to be considered and designated subposts of the main posts, and all matters pertaining to administration are to be conducted from the main posts. The effect of such concentration will be to simplify all administrative duties in the districts and reduce the expenses connected therewith. The chief advantage, however, will be an increase of coast artillery efficiency, due to the fact that with the larger posts garrisoned with a full manning body, or nearly so, battle and fire command drill may be had, and field officers of artillery will be given an opportunity thereby to practice in peace the fire-action duties connected with the larger tactical units, which they would be required to perform in war. In addition, the more formal routine life of large posts always makes for a higher standard of discipline than obtains at the smaller posts.

It is self-evident that to insure the efficient handling of all elements of the defenses in any harbor in time of war, at least one manning detail for all the elements is nec-

essary; and it is more than probable that in case of a long-continued attack on or siege of a harbor more than one relief for some if not all of the elements would be required. But while this is true in time of war, it is believed, after a careful consideration of all matters connected with the subject, that the completed defenses can be cared for properly in time of peace and the coast artillerymen authorized by law can at the same time be given proper training in the handling of all elements of coast defense, provided (1) that the scheme of concentration outlined above is carried out; (2) that the full number of all officers and enlisted men needed for the operation of mines, searchlights, and power plants as now authorized by law is kept up, and (3) that one-half of one complete manning detail of all officers and enlisted men required for the service of the guns proper shall be authorized by law as the peace footing for the fortifications of the United States.

As stated above, the maximum number of enlisted men now authorized for the gun defenses of the country is 14,351, and this is 4,080 short of one-half of one complete manning detail for the guns already mounted in the United States. The remaining half of one complete manning detail that would be required to place the coast defenses of all harbors of the United States on a proper war footing can be provided, it is believed, at comparatively small annual cost in time of peace if each of the coast States can be induced to organize a corps of militia coast artillery, having the same organization as the regular Coast Artillery. The State coast artillery corps could be assigned to the batteries which are in excess of those manned by the regular Coast Artillery. This belief has been confirmed by recent performances of certain portions of the organized militia of the coast States which, as the result of an invitation extended to the governors of the States by the War Department, participated during the summer in joint coast-defense exercises with the regular Coast Artillery. These exercises are referred to more fully hereinafter. From the excellent spirit, zeal, and desire to learn coast artillery gun work that has been exhibited by the militia in these maneuvers, and from what has been said by officers and men of the organizations who have so far taken part in them, it is believed that many of the coast States are disposed to consider favorably a proposition to organize such State coast artillery corps for the purpose stated. Moreover, it is thought that a class of men would enter these organizations who could not in war undertake military duty with the mobile field army owing to the prohibitive demands of business and family responsibilities.

If the authorities of the coast States can be induced to organize such coast artillery reserve corps, and the corps in each State is given an opportunity to take part annually in coast artillery maneuvers with the regular Coast Artillery and to receive instruction in coast artillery gun work, it is believed, from what has already been done, that these corps would in a very few years be all that need be desired for coast artillery reserve purposes—that is, they would constitute a reserve which could be quickly called out and formed at the defenses they are to man, and they would be sufficiently well trained to handle effectively certain battery, fire, and battle commands that could be assigned them. In case of sudden war such a body of coast artillery reserves would prove of incalculable value to the nation.

In direct connection with this question of providing the necessary number of trained coast artillerymen for the efficient handling of the elements of the coast defenses of our fortified harbors in time of war is the further question of providing certain bodies of coast defense infantry, which may be designated as "artillery supports," for the defense of the rear of the forts from attack by small parties of the enemy which may be landed from war ships for this purpose while the ships engage the forts in front.

Such "supports" were unnecessary in days of old when sea-coast forts were high-walled inclosures, with or without a surrounding moat and often with a counterscarp, redoubt, and glacis on the land front. Troops were provided within such forts for defense against attack from any and all sides. At the present day, however, the so-called coast-defense forts consist of a number of detached batteries—concrete and earthen embankments—often separated by considerable distances, behind which the heavy modern guns are usually so mounted as to be hidden from the front, but completely open and exposed to view from the rear. It is absolutely necessary that other men than those required to man the guns in a combat between coast forts and war ships on the sea side of the forts shall be provided to defend the batteries and their accessories—fire-control stations, searchlights, and power plants—from attack from the rear. It is thought that the defense of the land side of the coast forts should be intrusted to infantry, and it is believed that a certain portion of the infantry of the organized State militia should be set apart for this purpose.

During the coast artillery maneuvers this summer experiment was made along these lines. In the simulated attacks made against the land sides of the forts the defense was made by militia infantry, and from the excellent work that these troops have so far done it is believed that if they can be induced to take up the work of defending

the land approaches to the coast batteries and are given an opportunity to take part annually in such exercises as were conducted during the summer and to receive thereby yearly instruction in time of peace on the terrain they would occupy in war, they would form all that was needed for artillery supports, and would, like the State coast artillery reserves, prove invaluable to the nation in case of sudden war.

For the insular possessions, it is considered that one complete manning detail of regular Coast Artillery should be authorized by law as the peace footing for all the gun and mine defenses when completed. The impossibility of forming a militia or other reserve in these possessions renders the one complete manning detail of regular Coast Artillery, on both a peace and war footing, a necessity. It would, for a like reason, be necessary to rely on detachments from the regular infantry stationed in the islands for coast artillery supports in these possessions.

The importance of the early consideration by the proper authorities of some method of obtaining the trained personnel necessary to provide at least one manning detail for our costly coast defenses, as well as the troops necessary to protect the forts from attack from the rear in time of war, and, also, of taking the necessary steps in time of peace for carrying out such methods of training and mobilization as may be decided upon, can hardly be overstated; for, unless this is done, the full value of the defenses can not be realized in war, and until it is done we are liable to meet with national disaster in case of sudden outbreak of war with an attack by an enterprising maritime enemy. The method here suggested for obtaining this personnel is considered to be entirely feasible, and it is believed that if it is carried out as suggested it would prove comparatively inexpensive in time of peace. It would at short notice, in the event of sudden war, call to the colors well-trained artillery reserves and supports to supplement the one-half of one manning detail of regular coast artillerymen authorized by law as a peace footing. The ultimate effect of this would be to render every fortified harbor on our coast safe from sudden naval attacks or raids of an enemy and to leave our Navy perfectly free to perform its proper function on the sea of seeking the enemy's fleet, unhampered and untrammelled by any thought of unprotected cities, navy-yards, or ports at home.

MATERIAL.

The total amount already expended or available July 1, 1907, for the completion of the coast defenses of the United States is as follows:

Gun and mortar batteries.....	\$29,393,434.02
Guns and carriages.....	35,706,608.22
Submarine mines.....	5,799,202.27
Fire control.....	5,790,346.71
Searchlights for harbor defense.....	1,135,000.00
Total.....	77,824,591.22

The amounts estimated for completing the defenses of the United States, of the insular ports, and of the entrance to the Panama Canal, in accordance with the plans of the National Coast Defense Board, and for providing reserve ammunition therefor, are as follows:^a

United States:	
Estimate of National Coast Defense Board.....	\$50,879,339
Subsequently appropriated:	
Gun and mortar batteries (modernizing).....	\$250,000
Gun and carriages.....	306,000
Submarine defenses.....	900,000
Fire control.....	2,253,022
Searchlights, harbor defense.....	335,000
	4,044,022
	46,835,317
Insular possessions:	
Estimate of National Coast Defense Board.....	19,873,895
Subsequently appropriated.....	1,635,440
	18,238,455
Isthmian Canal:	
Estimate of National Coast Defense Board.....	4,827,682

^a Figures given include appropriation of March 2, 1907.

From the foregoing it will be seen that the coast defenses of the United States are considerably more than half completed. The expenditures for the portion of these defenses already completed have, however, been mainly for guns and their emplacements. Considering the present condition of these defenses, the four elements of defense most needed and which will, if provided, secure the greatest measure of public safety at the least cost, are:

I. The completion of the installation of the approved system of fire control for all guns and mortars mounted.

II. The provision of necessary searchlights for harbor defense at night.

III. The completion of the submarine-mine equipment of all fortified harbors.

IV. The provision of power plants for use in connection with both guns and mines.

I. FIRE CONTROL.

The total amount of funds appropriated for fire control in the United States up to date is \$5,790,346.71, which has been utilized as follows:

(a) The standard fire-control installations of Portland, Boston, New York, Puget Sound, and San Francisco are completed, or will be completed, from funds available. The installations at this time are in various stages, those of Forts Hamilton and Wadsworth being finished and that of San Francisco not yet progressed beyond the purchase of material. No further funds will be required for these harbors until such time as the additional defenses recommended by the National Coast Defense Board are provided, at which time the additional fire-control installation connected with these works will have to be taken up. The cost estimated by the National Coast Defense Board for this additional fire-control work is as follows: New York, \$96,200; Boston, \$268,200; Portland, \$45,000; Puget Sound, \$360,659, and San Francisco, \$84,000.

(b) Provisional fire-control installations have been installed, or are in process of installation, for all batteries and fire commands to which troops are assigned in artillery districts other than those mentioned as having the standard system for all batteries. These installations are not uniform in type, part being of the latest improved plans and part being according to plans now obsolete. They provide, however, a means by which all coast artillery troops can be instructed in accordance with latest developments in methods and appliances, and, while not as highly efficient for the purpose of defense as the standard installations, they in all cases would be capable of giving a comparatively efficient range and position-finding service. The provisional fire-control material will, so far as is practicable, be utilized later in the installation of the standard system when the latter is provided. Some of the provisional installations will be of little value, while others, by an addition of only 20 per cent, will be fully converted to the standard equipment.

On account of the recent increase of the coast artillery by forty-four companies, it will be necessary to extend this provisional installation. Funds are available for completing this work, a sufficient amount having been reserved from the last appropriation; and the extension of the provisional installation, so far as practicable, will be along the lines of the standard installation, so as later to merge into it.

(c) With the exception of Type "A" instruments and observation telescopes, there is very nearly enough ordnance equipment on hand or under manufacture to provide for the proposed fire-control installations of all the defenses so far provided in the United States. This is shown as follows:

Ordnance fire-control equipment.

Instruments.	Required.			On hand or under manufacture.	
	For defenses already provided in United States.	For defenses recommended by National Coast Defense Board for United States.	For insular possessions.	For United States.	For insular possessions.
Observation telescope.....	132	33	35	.....	.....
Plotting board, Fire Commander.....	40	7	6	14	.....
Range finders, Type "A".....	555	123	105	317	.....
Plotting board, gun.....	163	33	22	204	16
Range board.....	126	30	21	152	8
Deflection board, gun.....	126	30	21	131	8
Wind component indicator.....	126	30	21	126	8
Plotting board, mortar.....	88	14	14	70	.....
Deflection board, mortar.....	47	11	13	48	8
Set forward ruler, mortar.....	47	11	13	47	8
Prediction scale.....	47	11	13	50	8

The Ordnance Department now has on hand sufficient funds to purchase about one hundred and fifty (150) Type "A" instruments. This department will, therefore, soon have on hand more equipment than can be installed as part of the standard installation for some years to come.

From the \$900,000 appropriated for the current fiscal year, allotments were made by the Secretary of War as follows:

Engineer Department:

For completing work at San Francisco.....	\$432, 784. 81
Signal Corps:	
For maintenance and fixed expenses.....	120, 000. 00
For completing work at Fort Hancock, N. J., Botson, and Portland, including post telephone work.....	40, 000. 00
For completing work at San Francisco.....	237, 352. 00
For completing fire-control installations of mine stations in districts having provisional installations, and for extending provisional installations due to increase in Coast Artillery.....	69, 863. 19

For the insular possessions sixteen thousand (16,000) dollars was appropriated in 1905, and \$32,000 in 1906, for the purchase of ordnance fire-control equipment. Purchases have been made of equipment as indicated in the table above, and there are enough funds on hand to purchase all of the ordnance fire-control equipment required for the insular possessions except Type "A" range finders. During the last session of Congress \$100,000 was appropriated for fire control in insular possessions. It is believed that all of this will be necessary for completing the engineer work in Subig Bay. The National Coast Defense Board's estimate for fire-control installation at Subig Bay was \$243,391, of which \$181,600 was for the Engineer Department and \$42,200 for the Signal Corps, and the remainder for the Ordnance Department.

It is urgently recommended that liberal appropriations be made for fire control during the next few years, in order that this very important element of the defenses may be completed. So far only 5 of the 27 fortified harbors on the coast of the United States have had funds allotted for completing the standard fire-control installation. A single appropriation as large as the annual appropriations for gun defenses between 1897 and 1899 would be sufficient to complete all of the fire-control installations of the United States.

It is thought that the very least which should be provided during the next fiscal year for the United States is the completion of Hampton Roads (estimated by National Coast Defense Board at \$306,114); eastern entrance to Long Island Sound (estimated by National Coast Defense Board at \$762,775); and Narragansett Bay (estimated by National Coast Defense Board at \$616,861), amounting to a total of \$1,685,750.

It is recommended that fire-control funds be appropriated for those harbors of the insular possessions where gun defenses have been provided, so that when the gun defenses are completed the fire-control installations will also be completed, and the defenses thus rendered immediately serviceable.

The estimated cost is as follows:

Subig Bay.....	\$243, 391
Manila.....	561, 086
Honolulu and Pearl Harbor.....	320, 656
Guantanamo.....	280, 606
Total.....	1, 405, 739
Funds already appropriated.....	148, 000
Balance required.....	1, 257, 739

If the batteries are completed, guns mounted, and no fire-control installation provided, the defenses will be of little value. Mortars would be of no value whatever without some fire-control installation, improvised or otherwise. At night, when an attack may most likely be expected, batteries without searchlights would be practically useless. Searchlights, however, would be of no value without a fire-control installation. These are undisputed and fundamental principles of modern coast defense. In view of them, the relative cost of the battery and the fire-control installation which gives it life should be considered comparatively. The cost of a battery fire-control installation is about 5 per cent of the cost of the battery. The average cost of the fire-control installation per harbor is less than the cost of a single 12-inch battery of two guns.

The development of the coast artillery and the value of the present system of fire direction may be seen from a comparison of the results of target practice of 1900 and 1906. In 1900 the best result obtained at target practice with the larger caliber guns was by a battery which scored 50 per cent of hits at a range of 4,500 yards. firing at the

rate of one shot per gun every three minutes. During 1906 100 per cent of hits were obtained by a number of batteries at ranges of from 6,000 to 7,000 yards, firing at the rate of one shot per gun every forty-five seconds. From this it will be seen that, due to improvements in our system of fire direction and to efficient training of our coast artillery personnel, eight times as many hits from a heavy gun in a given time were obtained in 1906 as in 1900, and at a range in 1906 at which the chance of hitting is one-half as great as that at the range used in 1900. In other words, about sixteen times as many hits were made in 1906 from the same gun, in a given time, at the same range, as were made in 1900. Thus the expenditure of a comparatively small amount on our fire-control installation and by thorough training of our artillerymen the value of our gun defenses, as estimated by their hitting capacity, was increased sixteenfold in six years. The result of target practice for the year 1907 shows that this battery's hitting capacity has been still further largely increased.

II. SEARCHLIGHTS.

The searchlight as an auxiliary to gun and submarine mine defense has been rapidly developed within the last few years, and recent combined army and navy maneuvers have shown clearly that they are absolutely necessary for disclosing the presence of an enemy's ships at night. With them the ships may be so illuminated as to render the position-finding system almost as efficient at night as during the day; without them, a "run by" at night can be prevented only by means of mines or obstructions, which, in turn, can be removed with comparative ease if their location be not illuminated by searchlights.

The following is quoted from report of Board of Review of Army and Navy Exercises in June, 1906:

"The searchlights ashore were inadequate in number and many were deficient in power. There were no lights in reserve to replace those injured or destroyed, and those in use were unequal to the task of at all times lighting the channel of approach in a manner to guarantee detection at long or even medium ranges. But few targets could be illuminated at a time for want of sufficient lights. As operations against coast defenses are likely to be undertaken mainly under cover of darkness, the question of searchlights is one of primary importance. The best efforts of the artillery should be directed to the solution of the problem of the proper number, size, location, distribution, and employment of searchlights. It is, like many coast artillery questions, a local problem, and it should be worked out for each artillery district."

The estimated cost of searchlights necessary for gun defense of all fortified harbors of the United States, as given by the National Coast Defense Board, is \$2,376,000, and for mine defense \$669,000, giving a total of \$3,045,000 as the estimated cost of providing all the searchlights necessary for the defense of the United States.

By the act approved June 25, 1906, there were appropriated for the purchase of searchlights for harbors of the United States \$125,000, and by the act of March 2, 1907, \$210,000, leaving a balance of \$2,710,000 yet to be appropriated. At the average rate of appropriations for 1906 and 1907 it would take 16 years to complete this important accessory of the defenses.

The following table shows the number of searchlights now on hand, to be furnished from available appropriations, and the number yet to be provided:

Size.	On hand.	Under contract to be furnished.	Total lights recommended by National Coast Defense Board to complete equipment.	Can be purchased from appropriations since report of National Coast Defense Board.	Yet to be provided.
<i>Inches.</i>					
24	20				
30	29				
36	24	a 30	126		72
60	14		155	19	122

^a These 30 lights are portable sets, and it is the intention to first make use of them in determining the proper locations in the various harbors for the lights yet to be installed before assignment of them to permanent stations.

The estimated cost of searchlights for the gun defense of harbors to be fortified in the insular possessions, as given by the National Coast Defense Board, is \$589,000, and for mine defense \$174,000, giving a total of \$763,000. By the act of March 2, 1907, \$30,000 was appropriated for this purpose, which leaves a balance of \$733,000. The National Coast Defense Board also estimated \$228,000 as necessary for the gun searchlights at Isthmian Canal ports. This brings the total cost of providing searchlights for insular and isthmian ports to \$961,000.

The following table shows the number of searchlights to be furnished from available appropriations and yet to be provided for insular and isthian ports:

Size.	On hand.	Can be purchased from available appropriations.	Recommended by National Coast Defense Board.	Yet to be provided.
<i>Inches.</i>				
36	0	1	13	12
60	0	1	46	45

The total number of searchlights yet to be provided for home, insular, and isthian ports is 84 36-inch and 167 60-inch lights.

In view of the absolute necessity for searchlights for efficient coast defense and of the comparatively few lights on hand and that can be purchased with available appropriations the necessity for an increase in the appropriations for the purchase of these lights is apparent.

III. SUBMARINE MINES.

Recent war has shown clearly the value of submarine mines as an element of harbor defense. If a harbor is defended by an efficient system of mines and the requisite guns for their protection against countermining, sweeping, or other methods of removing them, it is not believed that any enemy, however enterprising, will ever attempt to force an entrance into a harbor with large ships. This conclusion has been supported strongly by the terrible destruction wrought by submarine mines at Port Arthur, Dalny, and Vladivostok during the Russo-Japanese war. Our system of submarine mines is practically perfect as a war weapon. Being under complete electrical control from the shore, a line of mines may be rendered instantly destructive to an enemy or harmless to passing friendly vessels.

Having so many guns and mortars already mounted in the United States, it is believed that the greatest amount of harbor defense at the least cost can be procured by the completion of the mine defense of all fortified harbors of the United States.

The estimated cost of completing the submarine-mine defense projects recommended by the National Coast Defense Board for home ports is \$2,147,932 and for insular ports \$988,046. Searchlights, fire-control apparatus supplied by the Signal Corps, and boats for mine work have been omitted from the estimates, these items having been considered with similar ones needed for the gun defense in order to simplify as well as to more economically control the expenditure of the appropriations.

While all progress toward the completion of both submarine-mine structures and equipment has been made to the limit of the available appropriations, it can not be too strongly pointed out that the completion of this defense of our harbors should be pushed to a condition of absolute preparedness. It will be noted that the above-mentioned estimates show that at less than one-third the cost of a fully equipped battle ship the mine defense of the United States can be completed from Portland, Me., to Puget Sound. When the value that this completed mine defense would have, not only for its actual worth as a destructive element of a harbor defense, but also for its moral effect in closing our harbors against sudden attack even by the most enterprising enemy, and the comparatively small cost at which this protection can be obtained, is considered, it will be apparent that this completion should be accomplished at the earliest possible moment.

Moreover, it should be clearly understood and fully appreciated by those in authority that we can not afford to wait for war before completing our mine defense, but must be prepared beforehand, for unless we are thus prepared no amount of money made available at the outbreak of war could procure mine material in time to be of service in mine defense against an active maritime enemy. Essential parts of this material, such as cables, mine cases, and electrical apparatus, can not be bought at a moment's notice in open market, but must be manufactured to order, and after having been ordered it requires months to fill the orders.

If confronted suddenly by war, only such mine material as is on hand can be utilized for immediate mine defense, and if any essential part of the mine system is lacking the whole mine defense must fail. If the enemy is aggressive, an attack on a harbor may even precede a formal declaration of war, as was the case in the attack on Port Arthur in February, 1904. To meet such an emergency the complete mine equipment of every harbor to be mined should be kept on hand ready to be planted, and it should be made possible to mine effectively every harbor within forty-eight hours.

IV. POWER PLANTS.

Under the heading of "Power plants and electrical installations," the National Coast Defense Board states:

"The use of electricity in connection with seacoast defense has become necessary for—

"1. Current for motors to operate ammunition hoists in order that the service of ammunition may be equal to the increased rapidity of the fire of guns.

"2. Current for the system of range finding, fire control, and fire direction.

"3. Current for searchlights.

"4. Current for lighting various parts of the emplacements and range-finding stations.

"5. Current for motors for retracting guns on disappearing carriages."

In a tabulated estimate of the coast artillery material needed for the completion of the harbor defense of "home ports" the Board's estimate for the cost of "central power plants" for these home ports is \$3,062,664; and for the cost of reserve plants is \$2,153,367. So far no direct appropriation has been made for power plants, such as have been so far constructed having been built from the general appropriations for gun and mortar batteries. No appropriations for new batteries in the United States having been made within the last two years, no power plants, as a consequence, have been built during that time. Such plants having become a necessity for the efficient service of batteries, lights, and communications, a liberal appropriation should be made for their construction each year until the amount as estimated for by the National Coast Defense Board shall have been appropriated.

[On Friday, February 21, 1908, Hon. Harry L. Maynard, a Representative from Virginia, and Messrs. Anderson, Coles, and Baldwin, business men of Norfolk, Va., appeared and were heard in behalf of the fortification of Cape Henry.]

OFFICE OF CHIEF SIGNAL OFFICER.

ADDITIONAL STATEMENT OF BRIG. GEN. JAMES ALLEN, CHIEF SIGNAL OFFICER, U. S. ARMY.

The amounts necessary for Signal Corps part of the fire control on Corregidor and Carabao islands, separately, are: For Corregidor Island, \$56,915; for Carabao Island, \$26,780. The above estimates cover the installation of a complete standard fire control equipment.

The Signal Corps shares of fire control at Pearl Harbor, giving what will be necessary if only the two 12-inch guns are emplaced there and the additional sum necessary if the contemplated mortars are installed at the entrance to Pearl Channel, are: For battery of 12-inch guns only, fire control installation, \$18,427; additional cost if the mortars contemplated are installed, \$6,875. Total, \$25,302.

The expense of installing the fire control for two 14-inch guns contemplated for Honolulu, and separately for the mortar battery for Diamond Head: Installation of two 14-inch guns, \$38,080. Additional expense for the installation of mortar battery fire control, \$15,000. Total, \$53,080. In installation of Pearl Harbor and Honolulu \$20,000 is necessarily added (\$10,000 for each installation) for the submarine cable connecting these two, which is absolutely necessary for coordinating the fire control of the two districts.

Regarding estimates for maintenance, in the first place it should be noted that some of the large standard installations, such as those of Portland, Boston, and New York, have been recently turned over, and consequently they have come in for maintenance charges so recently that the amounts required must be estimated from previous experience.

We have, however, a basis for estimates in our experience at Baltimore and Washington defenses, where installations made in 1905,

although not standard, are of sufficient completeness and magnitude to show what may be expected. During the three years of its existence the Baltimore Harbor cables have practically all been injured more or less seriously an average of at least twice a year. As a result, steps are now being taken to replace practically all these cables, as they are rapidly approaching a point where they can not be further repaired. They constitute, roughly, one-third of the cost of the Baltimore installation, which it is estimated will be \$140,000. The defenses of Washington have a relatively small amount of submarine cable, but even in this case serious injuries to the cables have resulted from their being hooked by anchors, and they will probably need replacement within two years more, the cost being about \$10,000 in a total of \$100,000 for the cost of the installation. In the Puget Sound district, where 15 miles of heavy and expensive cable are required to maintain communications between the three posts, strong current and tidal action have so injured the cables that immediate measures must be taken to replace them. These cables were put in in advance of the standard installation, which is now progressing there, and their useful life has been about four years. This cable cost, at present figures, about \$45,000, and it is estimated that the total cost of the Puget Sound equipment beside this will be about \$200,000. From the foregoing it would appear that the deterioration of submarine cables in harbors could easily be taken at 25 per cent.

When it comes to the provisional installations such as have been put in along the Southern Atlantic and Gulf coasts, the depreciation of overhead lines is very great, and that of the instruments is much greater than in northern stations. Take, for example, Pensacola, where a complete provisional installation was put in in 1903. An examination of the records shows that practically the entire equipment has had to be replaced within the five years of its existence, and all has had to undergo repairs which would aggregate very nearly as much as the original cost of the apparatus.

The depreciation of instruments in exposed emplacements or booths or in range-finding stations is very great. Besides this, it must be remembered that storage batteries, dynamos, and switchboard equipment are in the hands of enlisted men, who, in spite of the efforts of the artillery in training them, can not be considered as expert, and the depreciation of electrical apparatus in such hands is necessarily much greater than that in commercial establishments where trained men can be employed.

The other important item of maintenance, in addition to those named above, which include the cost of material for repairs and its installation in the districts, is made up of the proportional charges which are made for the payment of employees of the Signal Corps in Washington, New York, Fort Wood depot, and on the harbor-cable boats. These men are concerned in the purchase of supplies, inspection, their storage and shipment at the depots, installation, and in the necessary clerical work in carrying on the offices. This apportionment of maintenance is the foundation of all the work of the Signal Corps in fire control, since the continuance of the organization of an adequate force of this kind is a necessary basis upon which all estimates are made for new work, as well as for maintaining that which is already done. It is not to be understood, however, that the salaries of employees actually engaged in the work of new installations are counted in the appropriation asked for under this item.

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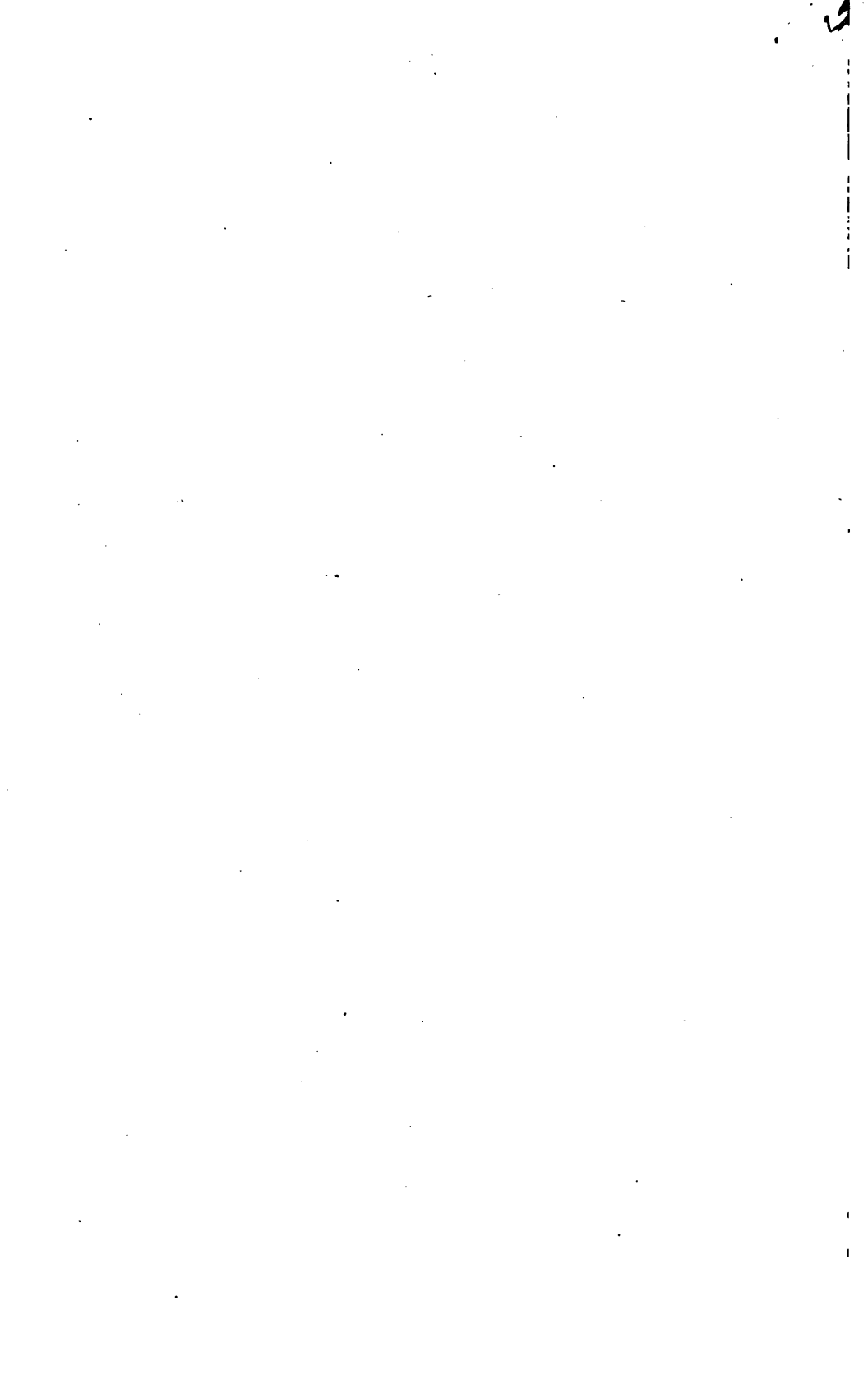
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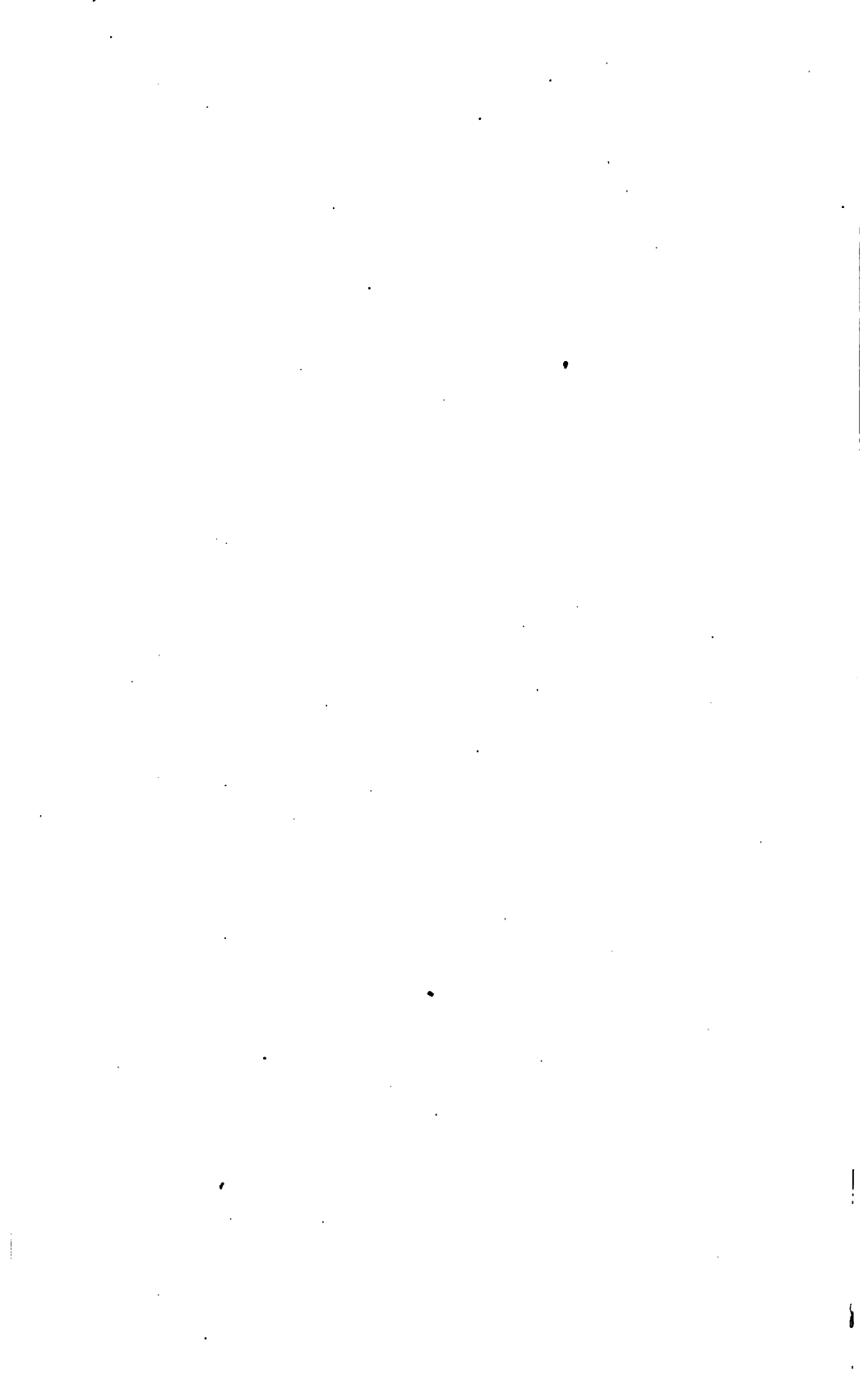


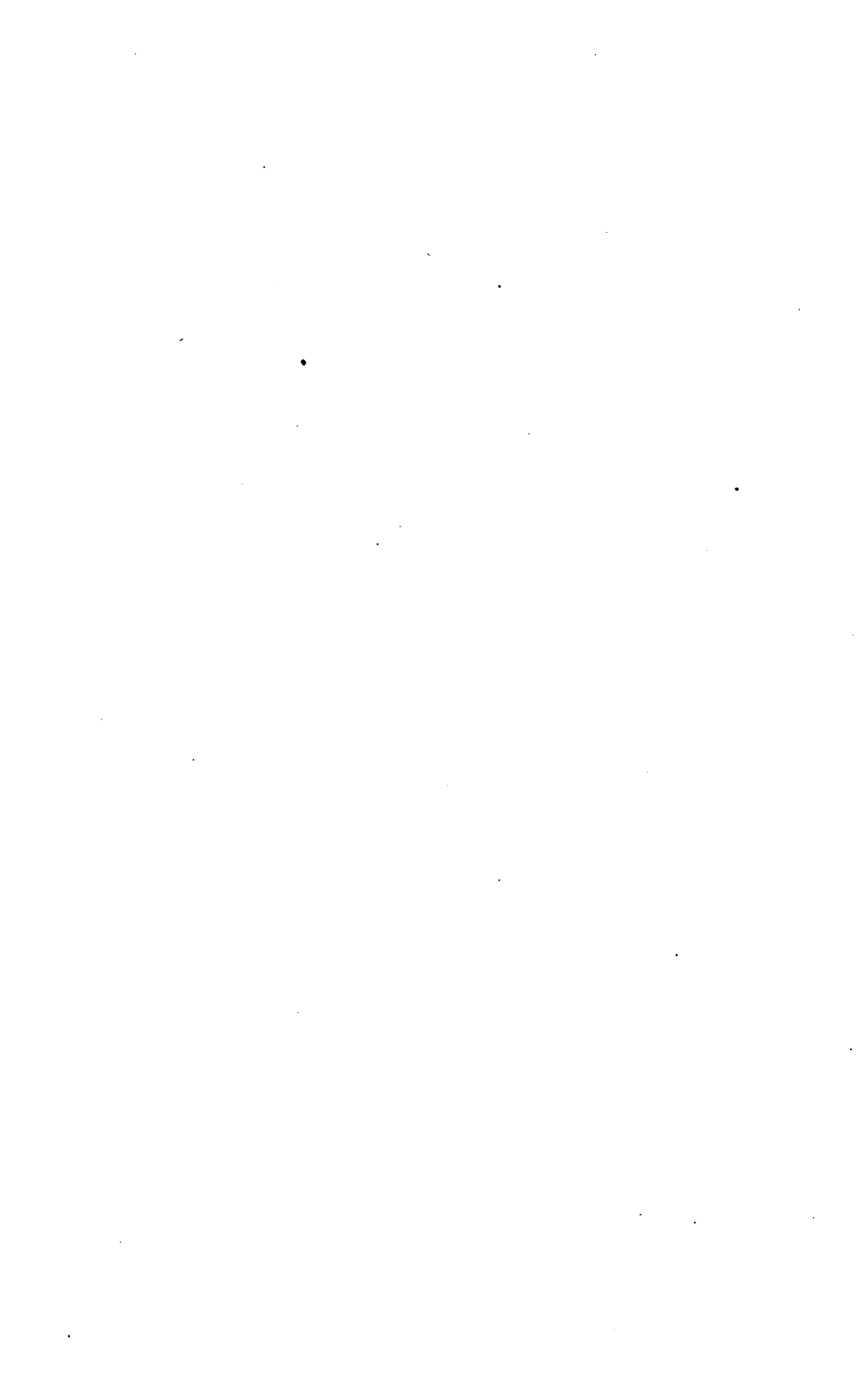














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